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Creed, Hon. J. M. ...	M.R.C.S. Eng., L.R.C.P. Ed. ...	Woollahra, N.S.W.
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Crossen, H. ...	L.F.P.S.G. ...	Melbourne, Vic.
Crowther, F. S. ...	M.B., B.S. Melb. ...	Melbourne, Vic.
Cunningham, P. H. ...	M.B., Ch. M. Glas.	Talbot, Vic.
Curtis, H. C. ...	M.R.C.S. Eng. ...	Semaphore, S.A.
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Cussen, G. E. ...	M.B., B.S. Melb. ...	Melbourne, Vic.
Cutts, W. H., sen. ...	M.D. Edin. ...	Hawthorn, Vic.
Daish, W. C. ...	M.D., B.S. Melb. ...	South Melbourne, Vic.
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Davies, T. S. ...	L.R.C.P. et S. Ed....	Benalla, Vic.
Dawes, R. St. M. ...	M.R.C.S. Eng. ..	Gawler, S.A.
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Dawson, — ...	——	s.s. "Massilia"
DeZouche, I. ...	M.D.Q.U.I., M.R.C.S. Eng. ...	Dunedin, N.Z.
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Duncan, R. B. ...	F.R.C.S. Ed. ...	Kyneton, Vic.
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Eccles, J. V. ...	M.D. Michigan ...	Melbourne, Vic.
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Fox, W. R. ...	L.R.C.P. et S. Ed....	Fitzroy, Vic.
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Jenkins, E J. ...	M.D. Oxon., M.R.C.P. Lond., M.R.C.S. Eng. ...	Sydney, N S.W
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Lane, T. ...	L.R.C.S.I., L.K.Q.C.P.I. ...	Inverell, N.S.W.
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MacKenzie, J. H. ...	F.R.C.S. Ed. ...	Wodonga, Vic.
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Morton, F. W. W. ...	L.R.C.P. et S. Ed. ...	Fitzroy, Vic.
Mueller, A. ...	M.D., Ch. D. Giessen	Yackandandah, Vic.
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PREFACE.

The Literary Committee, in presenting to Members the Transactions of the Second Session of the Intercolonial Medical Congress of Australasia, regrets the delay that has occurred in publication.

The success of the Session entailed difficulties through the mass of Papers submitted, and the consequent necessity for further financial arrangements.

The Government of Victoria, with great liberality, increased the sum which had been granted to defray the cost of publication.

In view of the decision of the Committee to keep the Transactions within a definite limit, it was unavoidable that many Papers should be curtailed, and that others, to the regret of the Committee, should be held back in their entirety. In several instances, also, the reports of discussions have been compressed, or even omitted.

In consequence of the great distances between the chief centres of population in Australasia, small delays frequently occurred while the requisite authors' corrections were being obtained, and in some cases these corrections could be dealt with only in the column of errata.

With these explanations, the Committee submits the result of its labours to the kindly judgment of the Members.

By order of the Literary Committee,

T. N. FITZGERALD.

Melbourne, 1889. President.

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CORRIGENDA ET ADDENDA.

Page xiii. After "Dawson," insert "Rankine, M.D."
,, xv. After "Gibson," insert "M.D., C.M. Edin.; Windsor, N.S.W."
,, xvii. For "Irving, J. A.," read "Irwin, J. A."
,, xviii. After "Lawrence," insert "M.R.C.S. Eng., L.R.C.P. Lond."
,, xix. In the eleventh line from the bottom, read "Glanville, S.A."
,, xxiv. "Simons, C. W.," should read "Simons, C. N."
,, xxvi. "West, R. A.," should read "West, W. A."
,, 78. In the fifth line from the bottom, read "is said."
,, 193. In lines 32 and 35, for "Chamberlain," read "Chamberland."
,, 435. In line 26, for "suburban," read "urban."
,, 437. In the fifth line from the bottom, omit the words "on the Health Officer."
,, 440. In the last column of both tables, after "Total," read "at all ages."
,, 441. Line 24, after the words "and five miles long," insert "and by a 6 ft. wrought-iron pipe, a further distance of five miles."
,, 442. Line 25, for "a rate which is 8d. in the £," read "a sliding scale, the maximum charge being 6d. in the £."
,, 449. In the eleventh line from the bottom, for "coroner's," read "coroners."
,, 455. In column 2, line 1, for "423,403," read "423,493;" and in line 3, for "952,524," read "452,524."
,, 497. In line 32, for "Croyden," read "Croydon."
,, 503. Line 7, for "Hawaia," read "Hawaii."
,, 589. In line 21, for "3·58," read "4·54;" and in line 23, for "4·54," read "5·85."
,, 636. In the third line from the bottom, for "symtoms," read "symptoms."
,, 776. In line 16, for "V 12," read "V R."

INTERCOLONIAL MEDICAL CONGRESS

OF AUSTRALASIA.

SECOND SESSION.

INAUGURAL MEETING.

MONDAY, JANUARY 7, 1889.

The Second Session of the Intercolonial Medical Congress of Australasia was inaugurated in the Wilson Hall, University of Melbourne, on Monday, January 7, 1889. His Excellency Sir Henry Brougham Loch, G.C.M.G., K.C.B., Governor of the Colony of Victoria, with Lady Loch and suite, arrived at 11.30 a.m., and was received and escorted to the dais by the President and the Members of the Reception and Organisation Committees. On the dais, which was decorated with plants from the Botanic Gardens, and flowers from the gardens of the Parliament Houses, were seated the Honourable Duncan Gillies (Premier of Victoria), Sir Henry Parkes (Premier of New South Wales) and the Misses Parkes, Mrs. T. N. FitzGerald, the Bishop of Melbourne and Mrs. Goe, His Honour the Chief Justice and Mrs. Higinbotham, Sir James MacBain (President of the Legislative Council) and Lady MacBain, Mr. M. H. Davies (Speaker of the Legislative Assembly) and Mrs. Davies, the Chancellor of the University of Melbourne and Mrs. Brownless, Colonel Sargood (Executive Vice-President of the Centennial International Exhibition) and Mrs. Sargood, Dr. Verco (President of the First Session of the Congress), Colonel Brownrigg (Commandant of the Victorian Military Forces) and Mrs. Brownrigg, the Right Worshipful the Mayor of Melbourne (Alderman B. Benjamin) and Mrs. Benjamin, Sir H. Wrenfordsley, Q.C., Dr. Kirtikar (of Bombay), Baron F. von Mueller, K.C.M.G., Professor McCoy, F.R.S., Professor Kernot (President of the Royal Society of Victoria), the Warden of the Senate of the University and Mrs. Topp, and other distinguished guests. The Members of Congress were seated in front of the dais, and the remainder of the hall was well filled with visitors.

The President (Mr. T. N. FitzGerald) took the chair, and invited His Excellency the Governor to formally open the Congress.

THE GOVERNOR'S ADDRESS.

His Excellency the Governor was enthusiastically received. He said :—

Mr. President and Gentlemen,—Your meeting here in Congress is one of the most important of the many very interesting events that will make this period memorable in the history of Australasia. The result of this Congress will be, I venture to believe, as greatly to the advantage of medical science throughout Europe and America, as it will be productive of great good in the country in which it has assembled. Eminent medical gentlemen have come from India and distant countries, as well as from all parts of Australia, to take part in the deliberations of this meeting; men whose reputation as medical scientists will give to the papers which they will submit to the Congress a position of commanding influence upon some of the greatest medical questions of the day.

The range of work that comes within the compass of medical science is so vast that no one mind can grasp and treat in an exhaustive manner the several branches in all their varied bearings; while, in the busy walk of practical life, few medical men can afford the time requisite for a close examination of more than one or two subjects of special study. These meetings are therefore of untold value, where the mental wealth acquired by individual scientists is collectively submitted to the critical analysis of their fellow workers, whose education, experienced observation and general knowledge properly fit them to discuss, consider, and estimate at their proper value the deductions that may with safety be drawn from the careful investigation of the specialist.

The amount of work which the preparation for a meeting of this character entails can only be adequately appreciated when we reflect that the papers to be read are the outcome of years of unremitting study and observation, devoted to the successful attainment of the noblest end to which the greatest intellects can be applied—the amelioration of human suffering in all its varieties and forms of misery—and thus indirectly, to the strengthening and development of the brain power of the world, on which the ever-growing requirements of the day make an ever-increasing demand.

It is perhaps a fitting close to the rejoicings with which the completion of the Centennial of Australasia has been commemorated, that this Congress should be now assembled in Melbourne. The past hundred years are replete with historic events which have created a British empire in the southern hemisphere; but marvellous as has been the progress which has led to this development, it is not so marvellous

as the advance that has been made during the same period in the knowledge and application of medical science; and if the experience of the past hundred years may be accepted as being any guide as to what the discoveries may be in the future, then those who may hope to live for the next thirty or forty years may revel in intellectual anticipations as to what they may then know and witness.

While the principal objects for which the Medical Congress has assembled will, without doubt, receive every consideration and be kept carefully in view, I trust the members of the Congress will likewise accept my assurance that it is our anxious desire to offer to all our most cordial welcome, whether they come from distant lands, from the sister colonies, or from our own country districts, as also to those whose familiar faces we gladly recognise as belonging to our own immediate neighbourhood; and I venture to submit as my personal medical contribution for the consideration of this great Congress, the proposition, which I trust may be carried without a dissentient voice, that health is largely promoted by a well-proportioned amount of relaxation and enjoyment of this world's pleasures, and I am not sure whether the rule advocated in this colony, eight hours' work, eight hours' sleep, eight hours' play, should not be adopted by this Congress as the great panacea against all ills.

I trust I may be permitted to congratulate Mr. FitzGerald, whose untiring efforts have in so large a measure contributed to bringing together so many eminent gentlemen, upon what I may safely, in anticipation, call this very successful meeting of the Medical Congress; and I congratulate myself upon its being one of the happy incidents connected with the position I have the honour to occupy in this colony, that I am permitted to be so far connected with this great and important meeting as to have been requested to perform the duty of declaring the Medical Congress open—a duty which I have now the honour to fulfil, with the most sincere and heartfelt good wishes that the result of its deliberations may tend to the advancement of science and to the benefit of mankind.

The President then called upon the General Secretary, Professor Allen, to read the Report of the Executive Committee.

Professor Allen accordingly read the following report:—

REPORT OF THE EXECUTIVE COMMITTEE.

May it please Your Excellency, Mr. President, Members of the Congress, Ladies and Gentlemen,—

At the close of the First Session of the Intercolonial Medical Congress of Australasia, held in Adelaide in August and September 1887, it was unanimously resolved that the Second Session should be held in

Melbourne in 1890, or at such earlier time as the Medical Societies of Victoria might determine, and Mr. T. N. FitzGerald was elected President of the Session. Professor Allen undertook to bring the question of date and other necessary matters before the Medical Associations of Victoria. Accordingly, he submitted the following proposition to the four Associations:—"That the Medical Societies of Victoria empower a Provisional Committee to fix the date of the next Session of the Intercolonial Medical Congress of Australasia, and to make all needful arrangements for such Session until a general meeting of enrolled members can be held, at which a Progress Report shall be submitted, such Provisional Committee to consist of the President-Elect, six representatives chosen by the Medical Society of Victoria, six by the Victorian Branch of the British Medical Association, three by the Ballarat District Medical Society, and three by the Bendigo Medical Society, the Committee having power to add to its number, five members forming a quorum." The Associations approved this proposal, and representatives were appointed as follow:—By the Medical Society of Victoria—Professor Allen, Dr. J. Jackson, Mr. E. M. James, Dr. Jamieson, Dr. Neild, and Dr. J. Williams; by the Victorian Branch of the British Medical Association—Dr. Cutts, Dr. Graham, Dr. Henry, Dr. Rowan, Mr. Rudall, and Dr. Springthorpe; by the Ballarat District Medical Society—Mr. Radcliffe, Mr. Tremearne, and Mr. Whitcombe; by the Bendigo Medical Society—Dr. Hinchcliff, Mr. MacGillivray, and Mr. Penfold.

The Provisional Committee, thus constituted, met for the first time on December 6, 1887, when Dr. Graham was elected Honorary Treasurer, and Professor Allen Honorary Secretary; Dr. J. W. Barrett and Mr. G. A. Syme were afterwards appointed Associate Secretaries. The terms of membership were defined, and a guarantee fund was created to cover any possible residual liabilities. Rules of procedure were adopted, and it was determined to exercise largely the power given to the Committee of adding to its number. In this way the Committee came to consist of 87 members, representing very fully, not only the Societies, but also the whole profession throughout Victoria. It was finally resolved that the Congress should assemble on Monday, January 7, 1889, and should rise on Saturday, January 12.

On April 5, 1888, a circular was addressed to members of the profession throughout Australasia. Over two thousand copies were despatched. The response was so satisfactory that on May 10 it was possible to hold the first meeting of enrolled members. The Provisional Committee was then converted into the General Executive of the Congress. A Special Organisation Committee was created, with power to determine the division of the Congress into Sections, to appoint the

officers of the Sections, and to perform all other acts necessary for the organisation of the Congress, reporting from time to time to the General Executive. This Organisation Committee consisted of the President, Dr. A. C. Brownless, Dr. Graham, Mr. E. M. James, Dr. Jamieson, Dr. Moloney, Dr. McCrea, Dr. Neild, Dr. James Robertson, Mr. Rudall, Dr. J. Williams, and the Secretary.

A Reception Committee was then appointed to make provision for the housing of the Congress and its Sections, and for the reception and entertainment of visitors. This Committee consisted of the President, Dr. Balls-Headley, Dr. Brownless, Mr. F. T. West Ford, Mr. E. M. James, Dr. Moloney, Dr. C. S. Ryan, Dr. Youl, and the Secretary.

Their Excellencies the Governors of all the Colonies kindly consented to act as Patrons of the Congress, and expressed their interest in its proceedings. His Excellency Sir Henry Loch, Governor of Victoria, graciously promised to render his invaluable assistance in promoting the success of the Congress, and in giving honourable reception to the members. The Executive Committee deplores the subsequent removal by death of Sir Anthony Musgrave, the late Governor of Queensland, who had written in the kindest manner about the prospects and work of the Congress.

The Honourable Duncan Gillies, Premier of the Colony of Victoria, kindly stated that the Government would do everything in its power to aid the Congress and to assist in the entertainment of members, and at his instance the Parliament voted a sum of money to cover the cost of printing the Transactions.

The Presidents of all the Medical Associations of Australasia accepted office as Vice-Presidents of the Congress; and with them were associated Dr. Verco, who so honourably discharged the office of President in the First Session; Dr. Sydney Jones and Dr. Creed, of Sydney; Dr. Cosby Morgan, of Newcastle; Dr. Garde, of Maryborough, Queensland; and Dr. Smart, of Hobart.

The University buildings, including the Wilson Hall, were offered for the meetings of the Congress, at the instance of the Chancellor, Dr. Brownless, and this offer was gratefully accepted.

After much consideration, it was determined that the Congress should be divided into nine Sections, namely:—(1) Medicine, (2) Surgery, (3) Hygiene, Forensic and State Medicine, (4) Anatomy and Physiology, (5) Pathology, (6) Obstetrics and Gynæcology, (7) Diseases of the Eye, Ear, and Throat, (8) Psychological Medicine, (9) Pharmacology. Two sub-sections were provisionally constituted for Diseases of the Skin and Diseases of Children. These were subsequently converted into Sections. A President, Vice-Presidents, and a Secretary were

appointed for each Section. The Presidents and Vice-Presidents were chosen from among the most eminent members of the Profession outside Victoria, the only exception being that Baron F. von Mueller, K.C.M.G., at the repeated request of the Organisation Committee, accepted the Presidency of the Section of Pharmacology. The Secretaries of Sections, for reasons which are obvious, were selected from among the members of the Profession in Victoria. Local Secretaries were appointed for the several Colonies, as follow:—for New South Wales, Dr. Muskett; for Queensland, Dr. Hare; for South Australia, Dr. Poulton; for New Zealand, Dr. Closs; for Tasmania, Dr. Pardey; for Western Australia, Dr. Thomson. The Executive Committee desires to acknowledge how much the exertions of the Local Secretaries have contributed to the success of the Congress.

Progress having thus been made, a final circular was issued to members of the Profession on July 8th, showing in detail the organisation of the sections. Of this circular, two thousand two hundred and fifty copies were distributed. Communications were addressed to the leading Medical Journals throughout the United Kingdom, France, Germany, the United States, and Canada; and through the kindness of the Surgeon-General at Calcutta, Sir Benjamin Simpson, and his Secretary, Dr. Bomford, circulars were distributed among members of the Medical Staff in the Presidencies of India. The Executive Committee desires to acknowledge the kind spirit which has characterised the notices of the Congress that appeared in the British and Foreign Medical Press.

At the instance of the Honourable the Premier of Victoria, the railway departments of various Colonies undertook to grant tickets at special rates to members of Congress travelling to Melbourne. The principal shipping companies also agreed to make concessions in favour of members *en route* to the Congress. For all these acts of courtesy, the Executive Committee now return its grateful thanks.

Concerning the work of the Congress, it was at an early stage determined that the President of each Section should deliver an Address, and that such arrangements should be made as to permit all members of Congress to listen to these Addresses. The Executive Committee believes that these Addresses alone would be ample justification for the assembling of members. But, in addition, two important General Meetings will be held, one for the discussion of Hydatid Disease, the other for the consideration of the varied questions relating to Typhoid Fever. Three afternoons will be devoted wholly to Sectional Meetings; and the Executive Committee desires to express its regret that comparatively little time is available in which to submit so many valuable papers.

A full programme of the Proceedings of the Congress has been printed, in which will also be found a sketch of the University Buildings, showing the rooms in which the Sections will meet. Convenient passes for members' use have been prepared. The Secretary will be glad to supply programmes and passes to any members who have not yet received them.

Special Demonstrations will be given in the various Hospitals, and in the Pathological Museum at the Medical School.

For the accomplishment of the work of the Congress, it is essential that meetings should be held both in the mornings and the afternoons. In order to avoid inconvenience, one of the large rooms of the University has been set apart in which lunch will be provided on Tuesday, Wednesday, Thursday and Friday. The Executive Committee trusts that as many members as possible will avail themselves of the opportunity so afforded for social intercourse.

For the full recording of the proceedings at the general meetings of the Congress, the Honourable the Premier has kindly arranged that Government Shorthand Writers shall be in attendance; and the Executive Committee gratefully acknowledges the assistance thus given.

It was resolved by the Executive that medical students in academic dress should be admitted to the meetings of the Congress.

The Executive Committee recognises with heartfelt thanks the assistance given by the leaders of social life in Melbourne, in fitly entertaining the Members of the Congress. At the close of this meeting, the Right Worshipful the Mayor of Melbourne, Alderman Benjamin, will receive Members at the Town Hall, and will entertain them at luncheon. On Tuesday evening, the President of the Congress requests the honour of the company of Members at dinner at the Town Hall. On Wednesday evening, His Excellency the Governor and Lady Loch will receive the Members of Congress at Government House. On Thursday evening, the Honourable the Speaker of the Legislative Assembly, Mr. M. H. Davies, has invited the Members of Congress to meet the Members of Parliament at dinner in the Town Hall. On Friday evening, the President of the International Exhibition, Sir James MacBain, and the Executive Commissioners, have invited Members to attend a Special Concert at the Exhibition. On Saturday, Sir William and Lady Clarke will entertain Members at a Garden Party at Rupertswood. On the following Monday, the Honourable the Premier, Mr. Gillies, and the Government of Victoria, have invited Members to an excursion by sea to Port Phillip Heads. The Metropolitan Liedertafel has resolved to invite the members of Congress to a smoke-night concert in the upper hall of the Athenæum, on Monday evening, the 14th inst.

The Yorick Club has, with great courtesy, admitted the Members of the Congress to the privileges of Honorary Membership.

The Right Worshipful the Mayor of Melbourne has placed at the disposal of members a room in the Town Hall, namely room five on the second floor, where one of the Congress attendants will at all times be on duty. Letters and parcels may be sent to this room.

For the decoration of the Wilson Hall at this Inaugural Meeting, the Congress is in large part indebted to the Hon. the Minister of Lands, and under his instructions to Mr. Guilfoyle, the Curator of the Botanic Gardens.

The Executive Committee desires to acknowledge the assistance which it has received from the Clerk of the Legislative Assembly, G. H. Jenkins, Esq.; the Town Clerk of the City of Melbourne, E. G. Fitzgibbon, Esq.; and from the Registrar of the Melbourne University, E. F. A'Beckett, Esq., and the members of his staff.

It remains only to record that the total number of members of the Congress is 553, of whom 13 are honorary members. Of the ordinary members 339 come from Victoria, 95 from New South Wales, 40 from South Australia, 24 from New Zealand, 16 from Queensland, 11 from Tasmania, 5 from Western Australia, 1 from the Northern Territory, 1 from New Guinea, 5 from England, 1 from India, 1 from the Dutch Indies, and 1 from Finland.

Dr. Verco (Adelaide) moved the adoption of the report. The Executive Committee was to be congratulated on having brought the preliminary arrangements in connection with the Congress to such a satisfactory issue. The Programme of the Proceedings indicated the amount of work members of the Congress had been stimulated to do, and the formidable list of socialities which it included showed the interest that had been excited in the non-professional section of the community. The inauguration of the Second Session gave hope of the firm establishment of the Intercolonial Medical Congress as a permanent institution.

Dr. Batchelor (Dunedin) seconded the motion. The work of organising the proceedings was entrusted to good hands when it was given to Professor Allen. From the programme which had been prepared, and the enthusiastic reception which had been given to members, he judged that the Second Session of the Congress would prove a thorough success.

The motion was carried by acclamation.

The President then invited the Hon. Duncan Gillies, Premier of Victoria, to welcome the visiting members.

THE PREMIER'S ADDRESS OF WELCOME.

The Premier (Mr. Gillies), who was received with cheers, spoke as follows :—

Your Excellency, Mr. President, Ladies and Gentlemen,—I have been requested to offer a cordial and hearty welcome on behalf of the Government of the Colony of Victoria, to those gentlemen who have come from the other colonies and elsewhere, for the purpose of attending this Congress. It must have been to them no small sacrifice to leave their homes, when they were engaged in important work, to attend the conference, but they have the satisfaction of knowing that they will probably be engaged in still more important work. I venture to think that no higher duty could be performed by medical gentlemen, than to attend a Congress where matters of the greatest moment will be discussed. The work of medical men is all important, for what better office can there be than the amelioration of suffering humanity? I feel quite confident that the labours of this Congress will be commenced in a desire to ascertain the truths of medical science, and to obtain more information than members possibly have at present with reference to the difficult questions that will be brought up for discussion. The labours of the members ought to do good, and I am quite sure that they will. I trust that members generally will be animated by a desire to help forward the greatest mission that any body of men can possibly be engaged in, and that is, the promulgation of sound laws for the protection of health and the removal of disease.

THE PRESIDENT'S INAUGURAL ADDRESS.

The President (Mr. T. N. FitzGerald) then delivered the following Inaugural Address :—

Your Excellency, Members of the Congress, Ladies and Gentlemen,—When last year, at the first Medical Congress ever held in the Australasian Colonies, I was chosen President-elect of the next similar gathering, I was very proud to have obtained such an honour. I received with feelings of profound gratitude the expression of confidence and regard that my fellow-workers, in the noblest of all vocations, were so good as to convey to me. And now as I stand before you, who have come hither from every part of Australasia to take counsel together on matters of grave import, I feel that I have reached the crowning point of my ambition; for I need hardly say, that although material success is very properly an object we may all laudably strive to win, if only we strive fairly and honorably, a still higher prize is that which is conveyed in the willing trust of a whole brotherhood. I wish, therefore, here to declare how deeply sensible I am of the honour of which I was then made the recipient, and how proud I am to occupy the place that now I

fill. Let me, however, sincerely assure you, that I feel conscious of considerable diffidence in having so closely to follow the late President, whose eloquent address in Adelaide won from us such enthusiastic and well-merited recognition.

And now let me offer you all a cordial welcome to Melbourne, which some of you, I dare say, behold for the first time. Our city has been called "Marvellous Melbourne," and no doubt for some reasons it deserves the title. It is very far from perfect, as we who have lived in it so long very well know. To it, then, such as it is, I bid you welcome! We will endeavour to make your stay in it as agreeable as we can, so that when you leave us, you may carry away not unpleasant reminiscences of your visit.

Gentlemen, before proceeding further, permit me to offer a few words of explanation. You are no doubt aware, before we left Adelaide, it was agreed that the Congress should be convened in 1890, and this resolution would doubtless have been adhered to, had not the political authorities of the day suddenly decided to hold the Centennial Exhibition and invite all nations. When the Commissioners were debating their preliminaries, a proposition was started that this would be a very favourable opportunity for holding the next session of the Congress. The suggestion at first encountered serious opposition from many who are generally foremost in support of any movement that tends to the advance of medicine, and whose opinions deserved most attentive consideration. The change contemplated was no doubt an important one, more especially as it involved a direct departure from the resolution tacitly agreed upon in Adelaide; but it was urged that, although a year's time was a very short interval between the two meetings, and allowed but a brief space to collect fresh facts and arrange material, yet the chance was too opportune to be missed. At another time, the means of travelling from distant parts would not be so easy, and assistance from other sources might not be so readily attainable. Consequently it was determined, on a full vote of the profession, to alter the Adelaide programme, and to convene our gathering this year. The date being fixed, those who had opposed the alteration the most strongly, very generously consented to act with the larger section, so that we have since worked together in perfect harmony in making the preliminary arrangements. I am delighted to say that the fear expressed by the opponents to the change, that the time would be too short to collect sufficient material, has not been justified by results, and that we have experienced from all quarters a most gratifying readiness to co-operate with us in making the Congress an unqualified success.

It has been asked, what are the especial advantages to be looked for from an Australian Medical Congress? What practical good is likely

to come from the gathering together of medical men in these southern lands? Are there, it is demanded, any diseases peculiar to Australia, or affections which have not been investigated exhaustively by the highest authorities in Europe? Do the conditions of climate and the social habits of the people modify diseases? Or do certain affections, which are common to all latitudes, assume here particular characters that differentiate them from the aspect they present under other geographical circumstances?

Well, I do not forget that, on the other side of the world, and especially in those large centres of human life where the perils of existence and the factors of disease are so many and so constant, the finest intellects are continually engaged, investigating in every branch and every branchlet of the compound science of medicine. They have abundant means, elaborate appliances, the fullest opportunity and uninterrupted leisure at their command, to work out the problems which continually are spread before them. The microscope enables them to make additions every day to the sum of that division of the medical sciences, which half a century ago, or even less, may be said to have had no existence. Histology is thus always revealing to them, and through them to the whole medical world, something new. The chemist in like manner is for ever throwing light upon etiology, pathology, and, especially in its larger significance, therapeutics. There are very many highly accomplished men content in their enthusiasm to spend the spring-time and early summer of their lives in the exhausting work of hospital duty, happy and well enough rewarded in their own esteem, if they but do now and then, amid the thousands of routine cases they have to treat, light upon some new clinical fact, or discover some hitherto unrecognised action of a drug. Surely, asks the pessimist querist, your local medical societies suffice for the report of unusual cases, and the exhibition of anatomical peculiarities or rare distortions; why then, with puny strength, endeavour to emulate the mighty efforts of the northern hemispheres, having in remembrance that some of their endeavours have not been crowned with perfect success?

We do not, we cannot hope to bear comparison with the great medical gatherings of the congresses or associations in Europe. But with all becoming humility, and with the admission that we cannot hope for some years successfully to rival our brethren in the healing craft in the old world, I have yet to say that we have here three thousand medical men, educated and trained in the same way, and qualified up to the same limits, as are those at home. We have amongst us representatives of nearly every medical school or college in Europe, who have opportunities of studying and treating disease and of maturing their knowledge, both in private and hospital practice. Then again, as we all well know, in

many medical and surgical affections, the practice adopted by some of the leading men in the different colonies is decidedly at variance (whether rightly or wrongly) with the views held by home authorities. Surely therefore we are able to add something to the sum of that knowledge which we have as a kind of joint-stock, and to the enlargement of which it should be both our duty and pleasure to contribute.

To reply further, it should be remembered that though the habits and conditions under which we live bear a social similitude, yet they are by no means identical with those existing in Europe. In the older civilizations and in America, we see the working population of the cities crowded together in a manner utterly unknown to us. The facts lately published by the Special Sanitary Commissioners of the *Lancet,* on the sweating system among tailors in Liverpool and Manchester, must be an incomprehensible revelation to the native born of these colonies. In the rural districts of the old country, the labourers are ill and insufficiently fed, ill-clothed, over-worked, and everywhere subjected to the extremes of cold or heat in their seasons. The wealthy, for the most part, especially the females, are fashion worshippers, self-indulgent, and almost entirely unemployed, the more active alone finding vent for their energies in eleemosynary efforts.

With us, on the other hand, the cities are wide spread (too much so if anything), each man, even to the poorest, lives in his own house, animal food is plentiful and cheap, the hours of labour are short, and summer and winter are much the same, except that in their seasons occasionally the hot days are hotter, and the cold days are colder. Such weather as is implied by the terms zero, blizzard, continuous rain, ice-storms, &c., we are unacquainted with, unless through newspaper description. On certain days it is true the heat is apt to be oppressive, especially to the inactive, and trying to the aged and sick, yet it can never be said to be unbearable or inimical to life. Then again, the difficulty and often impossibility of ensuring constant domestic service, compel even the most opulent of this community to do for themselves what they would be glad to pay others to do for them ; and thus, in the performance of household work, our gentlewomen procure for themselves an amount of bodily exercise, which, although unsought and sometimes unwelcome, is a distinct benefit to them, and there can be no question that it saves them from many ills to which they would otherwise be subjected. Thus then, in this continent we find men of all classes living under the most favourable circumstances, climate nearly all that can be wished for, healthy inheritance, both mentally and physically, ample space for every one, and well requited industry prevailing everywhere.

Surely with these happy surroundings, which exist, as far as I am aware, to such an extent in no other place, we have a spacious field, especially our own property, for investigating disease as it occurs uninfluenced by the many causes which excite and maintain it at home. For instance, we have long been taught, rightly or wrongly, that scrofula and tubercle are affected by squalor and dirt; that phthisis is favoured by close vitiated atmosphere and cold night air. These causes are present but to a slight extent with us, yet occasionally we find scrofulous impregnations excessively virulent; while phthisis is as common with us as it is in England, and decidedly more so than in Canada and Scotland.

Again, here in this land, certain acquired constitutional diseases in the tertiary ulcerative forms, such as rupia, are comparatively mild affections, and seldom present that grave character which is such a continual source of anxiety to the European practitioner. As a corollary to the limited intensity of such affections, we would expect to find skin diseases rare and mild in character. Is this the case? We are a busy people, yet melancholia is a common form of insanity to be met with in our asylums. Then again, do we enjoy an immunity from the nervous diseases so frequently to be met with in the great manufacturing and mercantile centres of Great Britain? And if we do not, what is the explanation? It is not difficult to discover, therefore, that the field for observation is here very wide, and that in whatever direction of special knowledge we may look, there is an abundance of matter to interest and occupy us, without at all travelling over trodden paths, or turning over ground which has yielded up all its nutrient elements to the cultivator.

There are a number of similar questions in which our peculiarly happy circumstances will perhaps allow us, by a process of elimination, to throw a light on obscurities, and to regard causes from a point of view from which, without these advantages, they cannot be seen by the profession at home. So too, should we ask ourselves, cannot advantage be taken of our almost unlimited space to bring under control such distressing social maladies as habitual drunkenness? Then again, is not this the opportunity to come to some agreement as to where a suitable mountain residence can be found for the delicate and consumptive? Whether a better treatment may not be advised in counselling protracted change—summering in New Zealand or Tasmania, wintering in Queensland, and spending the intermediate time in one of the other colonies?—for we have all climates with us. To arrive at any definite conclusion on these and many other matters, a consensus of opinion is required, and this can only be obtained by such a gathering of the profession as I see before me now.

If our environments are healthful, and certainly they should be so, the young manhood of this country, who, for the past few years only, has become an influence in its Councils, should present a type of the highest class. His birthright, the political freedom which has been handed down by his fathers; his inheritance, the home life, the decorum and gravity of a race bred under a cold ungenial sun; untrammelled educational establishments at his very door; no class distinctions to sneer him down, and every opportunity to gratify any inclination either in the playground, the workshop, or study—the Australian native should stand forth as the creature best able on earth to resist disease, and the most willing to listen to wholesome advice on sanitation. His love of out-door sports, engendered by easy hours of labour and the many open reserves, saves him from the several temptations which surround life at the time of its pubertal development; whilst the constant sunshine, the frequently recurring holidays, and variety of amusements relieve his toil from the chilling monotony that in other countries is the parent of habitual intemperance. Why then, in such an apparent paradise, peopled by those who ought to be Hercules and Apollos, are our death rates so high? This is a question that doubtless this Congress will enquire into, and its deliberations will, I trust, throw some light upon these vexed matters of drainage, ventilation, and the other items that so intimately affect the sweetness and healthfulness of life.

I wish, however, to draw attention to one or two points which, though perhaps well known to the profession, are not generally recognised by the public at large. In all English-speaking communities, the mortality bills are swelled principally by three affections—alcoholic intemperance, tubercular deposits, and typhoid fever—scourges in the main preventable; but the remedies for which, either from their expense, or from other causes, we will not boldly and manfully face.

Firstly then, with regard to drink. You all know how inimical to treatment its effects are, and how great is the misery it occasions. I have no wish to read you a teetotal lecture; there is, however, one peculiarity which stands out rather prominently, and which I think should have weight with us all, when, as medical men, we are called upon to prescribe spirits as a drug; and that is the fact that alcohol is much more potent with us than it is at home. If we turn to the statistics that Mr. Hayter annually furnishes to the Government of Victoria, we find that the deaths set down to drink are numerous compared with those of even the most intemperate countries; and such a calculation would naturally lead to the assumption that we Australians are an extremely drunken people. I do not desire to go out of my way to find excuses for much excess in this particular, nor

would it be proper for me to say that there is no drunkenness in Australia, but I assert with the strongest emphasis that habitual drunkenness is an exception with us. Visitors from abroad who have been to any of our great gatherings, at military displays, and racing carnivals, or who have seen the crowded attendances at athletic meetings in any of the colonies, must have noticed the absence of drunkenness and rowdyism. What really is the case is, that alcohol, in whatever form it may be taken, is not suited to the climate or the conditions of the people, so that hepatic and renal affections are sooner and more frequently engendered by its use than they would be under the same circumstances in a colder country.

Looking at the habits of European populations, however, I cannot but regard it as a slander upon our manhood, to charge them with systematic drunkenness. A great number of our native-born youths are total abstainers from birth, and, while not forgetting the intemperate opinions sometimes expressed by temperance advocates, I must admit that temperance societies have worked a great deal of useful reform. As a food in the low delirium of fever, and as a means of preventing waste of tissue in erysipelas and kindred diseases, and for the aged, alcohol is doubtless essential and of great service. Yet the death-rate ought, I think, to teach us the necessity of care in the use of intoxicating liquor, and that, as medical men, we should be very cautious, far more so than our brethren have need to be in colder climates. What we have to regard is the great probability of its continued and over-moderate use being prolonged when the necessity for its employment has ceased, and of its setting up local congestions, which, in time, destroy the functions of the organs they affect.

Of Phthisis and Typhoid Fever, I have already said that the former appears to be nearly as common in Australasian as in English towns; and typhoid, both in urban and rural districts, is nearly of twice as frequent occurrence. I think it offers occasion for the gravest consideration to discover how, in a country so richly endowed, and with a climate so genial, we should yet be afflicted to so terrible an extent with two diseases of parasitic origin, both of which, pathologists assure us, are eradicable. It is curious to notice how the etiology of phthisis has varied amongst physicians from time to time. In my early days, it was impressed upon us that consumption chiefly arose from defective ventilation, and the inhalation of irritant particles. Then came the catarrhal or pneumonic origins—neglected colds and so forth, and now we find that neither nor all of these reasons will suffice to account for the large bills of mortality from phthisis in this land. In my opinion, next to its hereditary inception, the greater part of phthisis will be found to be associated with defective drainage,

and this, I believe, will be proved by bacteriology. I cannot but think, therefore, that it will always be endemic with us until we devise some proper and complete method of carrying off our sewage and fluid house refuse.

Typhoid fever is with us a true *opprobrium medicorum.* It is with us, of us, among us, upon us. It is a spectre we apparently cannot exorcise. It is truly "the pestilence that walketh in darkness, and the destruction that wasteth at noonday." It is at once a terror and a reproach. It defies legislation and administration, it laughs at boards of health, and triumphs ruthlessly and always. Are we never to cope with this terrible affection? As far as Melbourne is concerned, we hope much from the Commission which is now holding its meetings; and we trust that whatever scheme is decided upon, it will be adopted without the long delay that generally follows the decisions of such bodies. But in the meantime, the same things go on. Streets are marked out, and houses are built without the semblance of drainage. Then the warm weather comes, and fever stalks each year more greedily and viciously than before. No doubt the section constituted to discuss matters relating to hygiene and public health will indicate what steps modern sanitation should take towards the suppression of this conspicuous evil. The views of medical men and health officers are always valuable when they take some practical form, especially on such a subject as public health. On such matters they alone, from their educational training, are capable of expressing opinions worth listening to. I sincerely trust our health boards will derive information from the deliberations of the Section of Hygiene.

Gentlemen, all branches of our profession seem steadily to advance. Annually some new surgical measures are contrived, some new drugs are introduced, some disorders discriminated. What future is there for Sanitation? Sanitation, unlike other divisions of our art, must go hand in hand with the educational progress and mental improvement of the people. Without the schoolmaster, all efforts we could make must inevitably prove futile. An intelligent conception of its purposes by the authorities, both parliamentary and local, is absolutely necessary. It is here that I hope much may result from such a gathering as this Congress, for in all matters that relate to medical and sanitary requirements it seems to be nearly an invariable rule for legislative enactments to be considerably in arrears. With borough and shire authorities, I believe these bodies do, in the main, the best their lights permit them, but the insanitary conditions of their respective localities are attributable I conceive to either a want of information, or a reluctance to exercise their powers. Because diphtheria happens to be absent for a time from their district, they fail to see danger in a cesspit, or the necessity of

milk inspection, and so forth. Doubtless the advanced education the young are receiving, in at least the better class of schools, the instruction in the elements of physiology and the general principles of hygiene, will in time have its effect on our future statesmen and councillors. And in this direction I think much benefit might accrue from the appointment of a few thoroughly trained and carefully chosen sanitary instructors, whose duty it should be to travel from town to town, and even from house to house, with the object of teaching the principles and the advantages of Health Laws, and the consequences of a disregard of them. For it is certain that the value of cleanliness cannot be properly understood until the dangers of filth are comprehended.

I should like while on this subject to say something in strong praise of the hygienic arrangements that have been carried out in Adelaide. The method of drainage appears to be as nearly perfect as it can well be, and as there is a large model of the system in the South Australian Court of the Exhibition, it would be well that every one interested in this subject should see it. If it be possible to adopt in this much larger city the same system, I am prepared to say that the death rate would be lowered to an extent now hardly dreamed of. Nor is the incidental advantage in connection with this system of the disposal of the sewage to be lost sight of. The Adelaide sewage farm is a very joy of scientific agriculture. In Sydney they are commencing with earnestness to drain their busy city; and although the underground drainage of Melbourne is at present little more than rudimentary, we have at least made a beginning.

But what is more encouraging, and prognosticates well for the generation that is to follow us, is the lusty out-door life, and the sturdy games the Australian so dearly loves. Amongst those who ever have seriously revolved the subject in their minds, some doubt must have arisen whether the youth of these great colonies would walk in the steps of their parents, or, influenced by a hotter sun, follow in the wake of their American kinsmen, and forsake the green sward for light amusements, ease, and luxury. I rejoice to say that this question is entirely set at rest, the Australian's prowess on the river and the cricket field has settled that matter, and he promises, as far as physical development goes, to even surpass his fathers. It is rather extraordinary that the out-door life and national games of the mother country should have taken such a hold on the young folk of Australasia, for I believe in no other part of the world have the sons of the Anglo-Saxon or Celtic emigrants done the same. Certainly, in America or South Africa, neither cricket or football is generally played. Now the love of these manly games must have an influence for good on the manhood of this country. Personally, I have no

sympathy with those who would decry these athletic exercises, either because at times they may be carried out too roughly, or sometimes are accompanied by some degree of danger. The very roughness of football is an element of good. It developes courage and good temper; one hears too much now-a-days about gentleness and the velvet hand. We require a little fibre which these games tend to impart. When I look at the footballer ready for action, I cannot help admiring his muscular frame, and sympathising with him in the pride he takes in his sturdy limbs, his form and activity. Contrast him with the boy one meets with on the Continent, parading through the streets. Which is the more likely to grow up a self-reliant, useful citizen, the footballer or the young gentleman who spins his tops and bowls his hoops in gravelled enclosures? Depend upon it, these games are important factors in the formation of the moral tone of this country. We should encourage them to the best of our powers, and endeavour to allay the fears of timid over-anxious parents. If a few limbs are broken annually, and even now and then unfortunately a death occurs, it would be better that four times the number of casualties should be told, than that our boys should grow up hypochondriacal and dyspeptic.

Looking round this assemblage of representatives of the great Guild of Medicine, drawn here from every province of Australasia, I cannot deny myself the pleasure of thinking that we are all students, still engaged in the work upon which we entered, some of us, many years ago. We have had our ambitions, our difficulties, our trials, our disappointments, and now and then our successes. We have been engaged in the hard business of living; we have had to contend with opposition on many occasions, and sometimes we have had good reason to believe we were not too fairly dealt with. However, I am sure it has been the consolation of all of us to feel, that in the acquirement of the knowledge necessary for the exercise of our craft, we commanded a source of enjoyment that nothing in the way of fret or ill or mere professional failure could take from us. We have thus all added something to the common store of medical knowledge. We have in this way experienced a delight compared with which the greatest material success holds only subordinate place. Like another God-like attribute, the *ars medendi* "blesseth him that gives and him that takes." It is a delight to make discovery in our science; but I am sure it is a delight still greater to know that the discovery may be of service to our professional brethren in relieving suffering humanity. It is thus a privilege to thank God for, that our domain of discovery can never be exhausted, and that no matter how great may be the researches of others, there is still left room for us to go on exploring. It is the very glory of medicine that it is not finite. It has been brought

against it as a reproach, that both its principles and its practice are always undergoing changes. I reply, with a feeling of triumph, that these changes are the very evidence of our progress. If we have a motto at all, it is "Onward." It is not our despair but our boast, that medicine is not an exact science. We are not content with what we have done, but we look forward to the greater, the better, and the higher doing. "Still achieving, still pursuing" we "learn to labour," and if we "wait" at all, it is not in the dull apathy of contentment at what has been done, but in the belief that "the Greatest is behind." It is with this feeling, this hope, this ever constant and unswerving faith, that I regard the coming together of my brethren on this the opening day of the Second Session of the Medical Congress of Australasia.

THE HON. MR. CREED (Sydney) moved a vote of thanks to the President for his learned and useful address. Mr. FitzGerald, as the head of his profession in Victoria, was fitly appointed President of the Second Session of the Intercolonial Medical Congress of Australasia, and his medical brethren were proud to elect to that high and honourable position a gentleman who was not only the most illustrious surgeon in Australia, but who had also a world-wide fame. No two more worthy representatives of the profession could be found than the Presidents of the First and Second Sessions of the Congress. At the close of the Session held in Adelaide, it was suggested that three years should elapse before the next meeting, but no definite decision was made on this point, the question being remitted to the medical societies of Victoria. The practitioners throughout all the colonies rejoiced that the interval had been reduced to eighteen months, for the programme of work now submitted showed such a mass of interesting matter to be dealt with by learned and distinguished men, that the assembling of the Second Session at this early date must be a gain to society and to the profession. Members were indebted to the President for many useful and practical suggestions, which must lead to earnest thought on the part of his hearers, and thus sooner or later bring benefit to the public. Even to the latest years of their professional lives they were still students, ready to learn from anyone who could help them to higher knowledge of their science. This was an age of federation, and to the medical profession of Australia belonged the credit of making the first practical suggestion of a federal character, viz., the establishment of a federal quarantine station, the absence of which was dangerous to the health, commerce, and prosperity of the colonies.

DR. E. C. STIRLING (Adelaide) had very great pleasure in seconding the vote of thanks to the President. No one was better qualified than

Mr. FitzGerald to speak with authority to the Intercolonial Medical Congress, and his address was marked by that thoughtful suggestiveness which characterised all his work. The President had also shown to the public that a medical address need not be dry and uninteresting. Mr. FitzGerald's name was a household word, not only in Victoria, but throughout the Australian Colonies, and it was, therefore, unnecessary for him to say one word to induce the Congress to carry the vote of thanks by acclamation.

The Congress rose *en masse*, and cheered long and lustily.

The President said:—Your Excellency, Ladies and Gentlemen,—I really feel too overwhelmed to say anything in acknowledgment of your most hearty vote of thanks. I can only thank you, and I do thank you very sincerely.

Dr. Manning (Sydney) proposed a vote of thanks to His Excellency the Governor, for the kind and gracious manner in which he had opened the Congress, and also for his address. His Excellency had shown such a warm feeling for the profession, such a sympathy for its work, and such a general appreciation of its higher aims and objects as must have gone straight to the heart of every member of the Congress.

Dr. J. Davies Thomas (Adelaide) seconded the motion with great cordiality. His Excellency had honoured the medical profession by his presence at the Congress, and its members had also to thank him for the generous and hospitable welcome he had given them.

The motion was carried by acclamation.

His Excellency the Governor, in acknowledging the compliment, said:—Dr. Manning, Dr. Thomas, Mr. President, Members of the Congress, and Ladies and Gentlemen,—I thank you very sincerely for the kind reception which you have given to the vote of thanks which has just been accorded to me. I can assure you it has given me very great pleasure to come here to-day to declare this important Congress open, and I only wish I may be permitted to be present on some of the occasions when the valuable papers, of which I have seen a list, will be read before the Congress. Dr. Manning referred to the fact that Mr. FitzGerald's address was so interesting that it could be appreciated by laymen as well as by medical gentlemen. I can assure you that many of the papers which will be read at the Congress, can and will be appreciated by laymen just as much as by gentlemen of the medical profession. Although they may not be so well understood by laymen as by medical gentlemen, they will be equally interesting to laymen, and as highly appreciated by them. Mr. FitzGerald, in his address, has referred to many matters of very great importance—of importance not only to the medical profession and the world at large,

but of special importance as affecting this colony, and this great city of Melbourne in particular. He has referred to those questions and sanitary considerations which are now occupying the attention of the Government and of the public very deeply, and I trust that the deliberations of the Congress on the important questions that may arise, will lead to wise and sound conclusions. I thank you very sincerely for the cordial reception you have given me, and I can only say on my own behalf, and on behalf of Lady Loch, that we are looking forward with very great pleasure to receive you on Wednesday night.

The General Secretary announced the succeeding business of the Congress.

The President then declared the Congress adjourned until 8 p.m., at the Freemasons' Hall.

RECEPTION BY THE MAYOR OF MELBOURNE.

At half-past 1 o'clock the members of the Congress, with other guests, were received by the Mayor of Melbourne (Alderman B. Benjamin) at the Town Hall. The reception took place in the Council Chamber, and at 2 o'clock the guests were invited to partake of luncheon in the main hall.

The Mayor occupied the chair, having on his right the President of the Congress (Mr. T. N. FitzGerald), the Minister of Public Instruction (Mr. Pearson), the Speaker of the Legislative Assembly (Mr. M. H. Davies), the Government Statist (Mr. H. H. Hayter, C.M.G.), and the Chairman of the Board of Railway Commissioners (Mr. R. Speight). On the left of the Chairman were Sir Henry Parkes (Premier of New South Wales), the President of the Legislative Council (Sir James MacBain), the Minister of Education of South Australia (Mr. J. C. F. Johnson), the Chancellor of the University of Melbourne (Dr. A. C. Brownless), the General Secretary of the Congress (Professor Allen), and the Government Botanist (Baron F. von Mueller, K.C.M.G.)

After the customary loyal toasts had been honoured, the Mayor proposed "The Governments of the Sister Colonies."

Sir Henry Parkes, on rising to respond, was received with loud applause. In the course of an eloquent speech, he said:—I have no doubt that this great assemblage of learned doctors will result in great good to the cause of science, and if so, as a consequence, great good to our common humanity. I happen to be one of those who have learned as one of the sums of my experience, that several of the greatest men in all acts of practical benevolence, and in all acts that tend to promote the progress of the world, are enlightened physicians. Certainly, there is no sphere of human action which opens grander avenues of usefulness than that of the physician, and to the honour of the profession there have been no greater men—no more benevolent benefactors—than many men who have honoured that most honourable profession.

Mr. Pearson, in responding to the toast of "Her Majesty's Ministers in Victoria," said that a few years hence, when it fell to the lot of the

Mayor of Melbourne at that time to propose the health of Her Majesty's Ministers in and for Victoria, the toast might be replied to by a Minister of Public Health. He had carefully said that such an event might come about some few years hence, not because he had the slightest doubt that such an office was terribly necessary at the present time, but because he was convinced that public opinion was not ripe for it. To create a portfolio, and to entrust it to the charge of a gentleman who had not the power to carry out what he knew to be needful, would be the most tremendous of mockeries, and at the present time people valued certain constitutional rights too highly to admit of that desirable change —the right of a man to pollute running water, the right of a man to spread contagious disease descending even to the third generation, the right of a man in every possible way to poison the life springs of the community—and many men would oppose to the death any interference with the privileges he had named. The corporation of Melbourne had honourably endeavoured to do its best to promote the health of the community, but he could not say the same of some of the boards of health in the metropolitan suburbs. He looked forward with dread to the time, which was certainly approaching, when the diseases which had been deliberately created, and against the fostering of which medical men and scientists had raised their voices for years past, would visit almost every household like the angel of death, and take away their spoil. A Minister of Health would be appointed when the community demanded a reform in regard to matters affecting the public health, and told the Government of the day to arm the Minister of Health with all powers necessary to sweep away all the evil products of the vested rights to which he had referred. But he felt that he was wandering from actual life into Utopia. We were living in the nineteenth century, and if such a reform were proposed, it would be denounced by the press as grandmotherly legislation, because it would be an interference with the vested right of every Englishman to carry death into his neighbour's household, and the Government that took the step would be swept out of power.

The Mayor, in proposing "The Intercolonial Medical Congress," expressed the pleasure which it had given him to be present at the inaugural ceremony. The Congress had assembled for the purpose of discussing matters of the gravest importance to the whole of Australasia, and he had no doubt that the result of the deliberations would be highly satisfactory.

The President of the Congress, in proposing "The Health of the Mayor," returned thanks to him on behalf of the Members of Congress, for the magnificent manner in which he had entertained them.

EVENING SITTING.

The Congress re-assembled at 8 p.m., in the Freemasons' Hall. His Excellency the Governor was present. Mr. T. N. FitzGerald, President of the Congress, occupied the chair.

The Address in Medicine was delivered by the Honorable W. F. Taylor, M.D., M.P. (Brisbane), President of the Section of Medicine.

The Address in Anatomy and Physiology was delivered by Professor T. P. Anderson Stuart (Sydney), President of that Section.

On the motion of the President of the Congress, hearty votes of thanks were accorded to Dr. Taylor and Professor Stuart. The Congress then adjourned till the following day.

SECOND DAY.

TUESDAY, JANUARY 8, 1889.

At 10 a.m., in the Pathological Museum at the Medical School, Dr. Maudsley demonstrated a collection of gynæcological specimens.

At 11.30 a.m. the Congress re-assembled in the Wilson Hall, the President, Mr. T. N. FitzGerald, occupying the chair.

The Address in Surgery was delivered by Dr. E. C. Stirling (Adelaide), President of the Section of Surgery, and the Address in Obstetrics and Gynæcology by Dr. Batchelor (Dunedin), President of that Section.

Cordial votes of thanks were passed to Dr. Stirling and Dr. Batchelor, on the motion of the President of the Congress.

The Congress then adjourned for luncheon, which was prepared in one of the large rooms of the Medical School.

In the afternoon, the Congress was divided into its Sections, which met in the various lecture theatres of the University.

THE PRESIDENT'S DINNER.

In the evening, the President of the Congress, Mr. T. N. FitzGerald, entertained the members and other guests at dinner in the Town Hall. His Excellency the Governor was on the President's right, and the Premier of Victoria (Mr. Gillies) on his left. Among those present were the President of the Legislative Council (Sir James MacBain), the Speaker of the Legislative Assembly (Mr. M. H. Davies), the Mayor of Melbourne (Alderman B. Benjamin), the Minister of Public Instruction (Mr. Pearson), the Commissioner of Public Works (Mr. Nimmo), the Chancellor of the University (Dr. Brownless), Mr. Justice Wrenfordsley, and the Executive Vice-President of the Centennial International Exhibition (Colonel Sargood).

The toast of "Her Majesty the Queen" having been honoured,

The President proposed "His Excellency the Governor." He remarked that His Excellency was always associated with everything good and charitable, and was ever ready to lend his support to any public movement of a professional or scientific character. The success which had attended the opening of the Congress, was in no small measure due to His Excellency's influence and to the great interest he had taken in the Congress.

His Excellency the Governor, in responding to the toast, said he took a great interest in the Congress, as he was of opinion that it would prove of immense benefit to the Colony of Victoria and to Australasia. He trusted that the visiting members would thoroughly enjoy themselves while performing the important duties which had brought them together. Amongst the various papers that would be read at the

Congress, and the discussions which would take place, there were none which would interest the people of this Colony more than those on the subject of sanitation. In the papers which he had heard read the previous evening, reference was made to the death-rate in England and the death-rate in these Colonies. There must be some cause for the death-rate amongst children in the Australian colonies being so much in excess of that at home, and it behoved the medical gentlemen who were now assembled in Congress to inquire into the nature of these causes. We were very apt in Australia to be seized with alarm at the bare prospect of cholera being imported here, and yet we were most neglectful in providing against typhoid fever—a disease which was carrying off thousands of the population. The Minister of Public Instruction had, at the Mayor's luncheon, referred to the apathy of the public with regard to the steps which it was requisite should be taken to guard against typhoid fever. He cordially agreed with the expression of opinion that had fallen from the Minister on that occasion. It was wonderful that there should be such an apathetic state of feeling amongst the people of this country on the subject of health. It was that apathy which prevented the necessary steps being taken to guard against the fell disease which was decimating the population. He earnestly trusted that the result of the conference would be to awaken public opinion upon this important matter, and that something definite would be done towards improving the sanitary condition of the Colony, and of Melbourne especially. The subject he had touched upon was not a political one, and therefore he had felt himself justified in referring to it.

The Premier (Mr. Gillies) proposed "The Intercolonial Medical Congress of Australasia." The toast was not merely a personal one, as it involved the success of the mission of the members. That mission was a noble one, as it aimed at relieving human suffering. The medical profession was one of the grandest under heaven, for it had probably done more good for humanity than any other. The study necessary to make men acquainted with all the known facts of medical science was a lifelong one, and members of the profession had often to undergo hardship in order to alleviate the sufferings of patients.

The President, in responding, said that there were over 550 members in the Congress, and the success of the gathering was already assured. The members were deeply indebted to the Government—and to Mr. Gillies personally—for the assistance and encouragement they had received from the State.

The Chancellor of the University of Melbourne (Dr. Brownless) in proposing "Visiting Members of the Congress," referred to the progress which had been made by the medical profession in the colonies.

THIRD DAY.

WEDNESDAY, JANUARY 9, 1889.

At 10 a.m., in the Pathological Museum at the Medical School, Professor Allen demonstrated a large collection of hydatid cysts in various organs. Special demonstrations and operations were conducted in the various Hospitals.

At 11 a.m., a General Meeting of the Congress was held in the Wilson Hall, when papers were read and discussed concerning the geographical distribution, pathology and treatment of Hydatid Disease. The Chair was occupied by Dr. E. C. Stirling, President of the Section of Surgery.

Members were invited by the Committee of the Hospital for Sick Children, to visit that Institution at any time.

At the close of the meeting the Congress adjourned for lunch, which was provided in the Medical School.

The afternoon was devoted to Sectional Meetings. His Excellency the Governor visited the Congress during the afternoon, and was present at the Physiological Demonstrations conducted by Professor Anderson Stuart.

RECEPTION AT GOVERNMENT HOUSE.

In the evening, His Excellency the Governor and Lady Loch entertained the Members of Congress at Government House. The company numbered upwards of a thousand ladies and gentlemen. All the state rooms were thrown open for the use of guests, who were welcomed by His Excellency and Lady Loch.

FOURTH DAY.

THURSDAY, JANUARY 10, 1889.

In the forenoon, a large number of Members visited the Women's Hospital, and were received by the Ladies' Committee and the Honorary Medical Staff.

At various other hospitals operations were conducted, and cases were exhibited in the wards.

At 10 a.m. in the Pathological Museum at the Medical School, Dr. Maudsley demonstrated a large collection of medical specimens.

At 11.30 a.m. a General Meeting of Congress was held in the Wilson Hall, the President, Mr. T. N. FitzGerald, occupying the chair.

The Address in Hygiene, Forensic and State Medicine was delivered by Dr. H. N. MacLaurin (Sydney), President of that Section, and the Address in Pathology by Dr. W. Camac Wilkinson (Sydney), President of the Section of Pathology. Hearty votes of thanks were tendered to Dr. MacLaurin and Dr. Wilkinson.

The Congress then adjourned for lunch, which was again served in the luncheon room at the Medical School.

The afternoon was devoted to Sectional Meetings.

THE SPEAKER'S DINNER.

In the evening, the Speaker of the Legislative Assembly (Mr. M. H. Davies) entertained the Members of Congress and other guests at dinner in the Town Hall. About five hundred gentlemen were present. The Speaker occupied the chair, and had on his right the President of the Congress (Mr. T. N. FitzGerald), the Minister of Public Instruction (Mr. Pearson), Dr. Kirtikar (India), the Commissioner of Public Works (Mr. Nimmo), and Judge Molesworth. On his left were Dr. J. C.

Verco (Adelaide), President of the First Session of the Congress, the Minister of Justice (Mr. Cuthbert), the Mayor of Melbourne (Alderman Benjamin), Professor Anderson Stuart (Sydney), the General Secretary of the Congress (Professor Allen), and Colonel Sargood, M.L.C.

The loyal toasts having been duly honoured,

THE SPEAKER proposed "Success to the Intercolonial Medical Congress." It was a good thing for any profession to have such meetings from time to time, so as to interchange views and cultivate friendly relations. The legal profession would reap great advantages if, at stated intervals, its members came together to carefully consider questions of general interest, and advise the public concerning necessary legislation. The medical fraternity occupied so important a position in relation to public health, that it could command the hearty sympathy of the community whenever it assembled in such Congresses as this. It must be acknowledged that whatever tended to advance medical knowledge, tended also to the saving of life and to the amelioration of pain. Everyone should therefore be willing to give a very earnest welcome to those gentlemen, who had at great sacrifice to themselves come to Melbourne, to assist their brethren resident here, in arriving at conclusions which would be beneficial to the profession generally. He had been asked—"Is it not time that a Minister of Public Health should be one of the leading members of any Ministry?" The question had been introduced at the Congress, and it had gone forth to the people of the Colony, and possibly it would be asked by electors at the approaching election. It was satisfactory to find that the Congress was likely to be more beneficial than the most sanguine had anticipated.

THE PRESIDENT of the Congress (Mr. T. N. FITZGERALD), in responding, said that the session of the Congress had not alone served to benefit members individually, but it had done more to federate the profession in Australasia than anything that had occurred in the past.

The GENERAL SECRETARY of the Congress (PROFESSOR ALLEN) also responded. He expressed his belief that a time of great change was coming in medical and sanitary matters. He could not agree that a Minister of Public Health was exactly what was needed. A permanent Commissioner of Health was required. A man was wanted who would be trained steadily year by year in the duties of his position, and who would come forward and be the leader of medical and sanitary work in the colony. Such a man was wanted, and not a Minister of Health, who must come and go with each Administration. To keep the Congress supplied with original material, schools of research were needed in every colonial University; and in Sydney, Mr. Macleay, M.L.C., had bequeathed to the University the noble gift of £40,000 to endow research scholarships. These scholarships were to be open to everyone who had the degree of Bachelor of Science, and, owing largely to the influence of Professor Anderson Stuart, that degree was open on comparatively easy terms to every graduate in medicine. Who was the man who would make some like provision in Victoria? Without it great success could not be achieved. We must have research, and an endowment must be secured. He returned his hearty thanks to the local and sectional Secretaries for the valuable assistance they had given him in connection with the Congress.

Mr. Pearson (Minister of Education), in proposing "Our visitors," and welcoming guests from other colonies, said :—The public which looks only superficially on what is being done—which sees the reports of essays in which the learning is almost overpowered by the eloquence, followed by pleasant and animated discussions, combined with such social gatherings as this—may be apt to think that the pursuit of science is an extremely light and even fascinating matter. But I need not say to members of the medical profession, that the duties of your lives are of a very different kind. I do not propose to fall back upon the commonplaces of medical history, on the fact that day by day the commonest country doctor, or even town doctor for that matter, is called upon to expose himself to the rigor of the elements, to face infectious disease, and to endure any amount of fatigue. I don't wish to recall here such facts as that of the noble English surgeon, who, when a ship had hoisted the yellow flag, and was without a medical man, went there to die among the patients who were suffering from yellow fever. Nor do I intend to speak about such topics as the cholera at Naples, when medical men flocked thither from every part of Europe, to take up the posts left vacant by the medical men who had succumbed to the disease. These doings, gentlemen, you all know, are part of your everyday duties, and you accept them in that way ; but it is a different matter when we come into the boundless domain of science. There are those who undoubtedly think that the life of a scientific man is utterly divested of these heroic incidents. I speak from most imperfect knowledge, but even I know that not a single great discovery in the treatment of disease has been made except at the cost of more or less lives, and to the ruin of a certain number of constitutions. For men have died of poisoned blood in experimenting with poisons and gases, and in making researches in deadly disease, which they have followed up with as sublime a devotion to science, as ever a missionary felt in the cause of religion. The faith which inspires that devotion, and which animates those sacrifices, is a faith which makes men heroic, and lifts their profession far above that which common men can aspire to. And it is not only in this splendid desire to penetrate into the secret of God's law that the medical profession has distinguished itself. There is another side to the matter. Every scientific man who has studied disease, as you gentlemen have, goes about the world armed with a mysterious knowledge. Not only is he entrusted with the secrets of families which he never divulges, but he is the father confessor to hundreds of men whom it may be he only passes by in the streets, but whose histories he reads in their faces or in their gait. In this poor tattling, scandal-mongering world, the fact that you get a regiment of men, recruited indiscriminately from every class, armed with this tremendous knowledge of the secrets of humanity, and keeping it as secretly as the Catholic priest keeps the seal of confession, is a fact which in itself marks the profession as no common one. I am called upon to propose the toast of the visitors to the Congress, who have shown that zeal to decipher the secrets of science which I have mentioned as one of the grand attributes of the profession, and who share with others that splendid reserve by which the profession at large is guarded. To be able to devote lives to the study of divine law, to be able to draw the veil impenetrably over personal secrets, are, it

strikes me, qualities of the very highest kind. I propose the health of our visitors.

PROFESSOR ANDERSON STUART (Sydney), in acknowledging the toast, said that the visitors from the other colonies came to Melbourne filled with the most agreeable anticipations, which had been abundantly realised. Their sojourn had been made both pleasurable and profitable, and they would regret to leave Victoria when the time of their departure arrived. This was a wonderful colony, and Melbourne was indeed a marvellous city. He never saw the metropolis of Victoria without feelings of admiration for the energy and enterprise of its citizens, and he never left Melbourne without feeling that he had been intellectually stimulated by contact with its leading citizens. For its age the colony had attained to a wonderful degree of progress. He hoped the Intercolonial Medical Congress would one day visit old Sydney, and he could ensure them a hearty welcome to the metropolitan city of Australia.

Dr. J. C. VERCO (Adelaide), President of the First Session of the Congress, likewise acknowledged the toast. When the First Congress was held in Adelaide eighteen months ago, they exchanged congratulations on the fact that there were 150 members, whilst now there were 550 members. The papers had been of a higher order, and the discussions had been more complete.

FIFTH DAY.

FRIDAY, JANUARY 11, 1889.

In the morning, operations were performed and demonstrations conducted at the various hospitals.

At 10 a.m., in the Pathological Museum at the Medical School, Dr. Maudsley exhibited a large collection of surgical specimens. At the invitation of the Committee of Management, a large number of members inspected the Melbourne Hospital.

At 11.30 a.m., a General Meeting of the Congress was held in the Wilson Hall, the President (Mr. T. N. FitzGerald), occupying the Chair.

Dr. F. Norton Manning (Sydney), President of the Section of Psychological Medicine, delivered an Address on "Lunacy in Australia."

Dr. M. J. Symons (Adelaide), President of the Section for Diseases of the Eye, Ear and Throat, delivered an Address on "Specialism."

Votes of thanks to Dr. Manning and Dr. Symons were carried by acclamation.

The Congress then adjourned for luncheon, which was served in the Medical School.

At 2 p.m., a General Meeting of the Congress was held in the Wilson Hall, when papers were read and discussion instituted concerning the prevalence, etiology, pathology and treatment of Typhoid Fever. The Hon. Dr. Taylor, President of the Section of Medicine, occupied the Chair.

At the close of the discussion it was unanimously resolved, on the motion of Dr. Verco (Adelaide), seconded by Dr. D. Colquhoun (Dunedin) :—

"That the members of the Intercolonial Medical Congress regard it as proved that Typhoid Fever is a preventable disease, which owes its prevalence mainly to insanitary conditions, and above all to contaminated water supply, defective drainage, and improper disposal of night-soil."

The following motion was also carried, on the proposition of Dr. Turner (Melbourne), seconded by Dr. J. Davies Thomas (Adelaide) :—

"That while there is reason to believe that the source of water supply of Melbourne is carefully guarded, it is certain that as regards drainage and night-soil disposal the arrangements are very unsatisfactory, and to these defects must be ascribed in a great measure the excessive prevalence of Typhoid Fever year after year."

On the motion of Mr. E. M. James (Melbourne), seconded by Dr. Bright (Hobart), the Congress unanimously agreed :—

"That in the opinion of the Congress it is the imperative duty of the Government to take immediate steps for bringing about an improvement of the sanitary condition of Melbourne, and specifically for the construction of a proper system of underground drainage, which shall include the removal of night-soil by water-carriage."

The Congress then adjourned.

CONCERT AT THE EXHIBITION.

In the evening, at the invitation of the President (Sir James MacBain) and the Commissioners of the Centennial International Exhibition, the members of the Congress were entertained at a Special Concert at the Exhibition Building. The magnificent Orchestra, under the baton of Mr. Cowen, performed a splendid selection of music.

SIXTH DAY.

SATURDAY, JANUARY 12, 1889.

At 10 a.m., a General Meeting of the Congress was held in the Wilson Hall, the President (Mr. T. N. FitzGerald), occupying the Chair.

The Address in Pharmacology was delivered by Baron Ferdinand von Mueller, K.C.M.G., President of the Section of Pharmacology.

Dr. Neild proposed that a vote of thanks to the illustrious savant who had just addressed the meeting, and expressed the hope that the learned paper thus submitted would give an impetus to the study of Pharmacology in Australasia. The unceasing devotion of Baron von Mueller to his scientific studies was known everywhere, and his name was held in high honour. The Congress would have been incomplete had he been absent from it.

Dr. Thomas Dixson (Sydney) seconded the motion. Coming from a neighbouring colony, he had been somewhat surprised and much delighted that the Section of Pharmacology had fully justified its existence.

The motion was carried by acclamation.

SPECIAL MEETING.

A special meeting was then held to determine the place and time, and to elect the President of the next Session. The President (Mr. T. N. FitzGerald) occupied the chair.

Dr. Philip Sydney Jones (Sydney) said he had the honour to submit, for the consideration of the Congress, a motion which he felt confident would receive the most hearty support, and an invitation which he hoped would be accepted with the same cordiality with which it was given. The motion was as follows :—

"That the Third Session of the Intercolonial Medical Congress be held in Sydney in the year 1892, or at such earlier period as the Medical Societies of New South Wales may determine."

It was not the desire of the Sydney representatives present, to bring about the holding of the next Session of Congress in twelve months from the present time, but it might possibly be found more convenient to meet at the end of the year 1891, or to hold the Congress at a pleasanter season of the year, as the summer heat in Sydney was very trying. For these reasons it was desirable to leave the matter in the hands of the medical profession of New South Wales, who were anxious that the Sydney meeting of the Congress should conduce not only to the edification of the minds of the visiting members of the profession, but also to the invigoration of their bodies. The medical men of New South Wales could not hope to surpass their friends in South Australia or Victoria, either in the perfection of the arrangements for the Congress, or in the sumptuousness of their hospitality, but they certainly tendered to the Congress a most cordial invitation, and would do their best to make the Sydney meeting a thorough success.

Dr. Knaggs (Sydney) seconded the motion.

The General Secretary (Professor Allen) said he had received from Dr. Dawson, who represented the Medical Association of New Zealand, an invitation for the Congress to meet in that colony as soon as possible; but the New Zealand representatives did not desire that their invitation should interfere with the invitation which had been so graciously given by the representatives of New South Wales.

The motion was then put to the meeting, and carried by acclamation.

Mr. E. M. James (Melbourne) said it was with great pleasure and confidence that he submitted the following motion :—

"That Dr. MacLaurin, the Medical Adviser of the Government of New South Wales and President of the Board of Health, be elected President of the Third Session of the Intercolonial Medical Congress of Australasia."

The Hon. Dr. Creed (Sydney) seconded the motion, remarking that no better choice could be made. Dr. MacLaurin not only held first place in the profession in New South Wales, but also first place in the affections of his medical brethren, who would feel that the interests of the colony would be thoroughly conserved by that gentleman during his tenure of office.

The motion was carried unanimously amid loud cheering.

The President.—It is extremely gratifying to myself to know that you have selected such an able member of the profession as Dr. MacLaurin, and I am sure you could not possibly have chosen a better President.

PRESENTATION TO DR. POULTON.

Dr. M. J. Symons (Adelaide) then rose, on behalf of the South Australian members, to present to Dr. Poulton a token of appreciation of his services during the First Session of Congress. All members were greatly indebted to him for the enormous work which he did as Secretary to that Congress, and in addition, they remembered that Dr. Poulton was the first to suggest that an Intercolonial Medical Congress of Australasia should be held. A meeting was accordingly held in Adelaide, and a circular was addressed to the South Australian Members by a Committee consisting of Drs. Gardner, Stirling, Stewart, Thomas, Verco, and Way, with Dr. Symons as Treasurer. In consequence, the Committee was enabled to present Dr. Poulton with a silver inkstand, appropriately inscribed, in place of the one which he had worn out in their service, and to add to it a purse of sovereigns, which he now requested the President to present to Dr. Poulton.

The President said it was his most pleasing duty to hand the souvenir to Dr. Poulton, to whose great ability, care, judgment and discretion as General Secretary, the success of the First Session of the Congress was, in a large measure, unquestionably due. He (the President) attended the Congress, and had found Dr. Poulton ready to give information on all needful points, and he only regretted that he had been excluded as a Victorian member from joining in this presentation.

Dr. Poulton said :—Mr. President, Dr. Symons and Gentlemen,— I cannot describe the peculiar satisfaction and pleasure with which I receive from my brethren of South Australia this handsome and altogether unnecessary memento of a time which I shall never forget. It did fall to my lot as a member of the Council of the local Branch of the British Medical Association to make the first suggestion, so far as I am aware, with regard to holding Medical Congresses in Australasia. Dr. Symons has said that the Congress is indebted to me ; but I feel myself much indebted to the Congress. I shall always remember the kindness of my Committee, the unfailing energy of its members, and the general cordiality and good feeling which prevailed. I feel deeply the very great kindness which actuates my friends in giving me this beautiful present. I thank you, Mr. President, for your kind words, and my friend Dr. Symons and my colleagues in South Australia for this expression of their goodwill.

Dr. Kirtikar (Bombay) said he had the pleasure to offer for the acceptance of the President (Mr. T. N. FitzGerald) and the General Secretary (Professor Allen), copies of one of the oldest native Indian medical works in Sanscrit. He then read a sonnet addressed to the Congress.

The President and General Secretary accepted the souvenirs with thanks.

HEALTH LEGISLATION AND UNQUALIFIED PRACTITIONERS.

Dr. Springthorpe said that, by the instructions of the Section of State Medicine, he had to submit the following resolution, which had been drafted by Dr. MacLaurin, the President of the Section :—

(1) "That this Congress urges upon the notice of the different Governments of Australasia the necessity which exists for fresh legislative enactments in all the

colonies, with a view to obviate the grave dangers to public health which everywhere prevail, and which in many cases are due to easily removable causes."

(2) "That in the interests of the public, this Congress urges upon the various Governments of Australasia the necessity for amendments in the laws relating to the position of medical practitioners, in order that the public may be in a position at all times to protect themselves against the impositions of unqualified persons."

(3) "That copies of these resolutions be forwarded by the secretary to the Federal Council, and also to the Governments of the different colonies."

Dr. Morgan (Newcastle, N.S.W.) seconded the motion, which was carried unanimously.

The General Secretary reported that numerous letters had been received from leaders of medical thought in Europe and America regretting their inability to be present at the meetings of the Congress.

VOTES OF THANKS.

Dr. Verco (Adelaide) said that an imperative duty yet remained; the Session would be incomplete if it were not performed; and accordingly, it was an honour and a pleasure to propose a vote of thanks to the President, Mr. FitzGerald. It was evident to visitors from the other colonies that Mr. FitzGerald was the idol of the Victorian practitioners, and all visitors would agree, after the experience of this Congress, that the idolatry was deserved. He therefore moved that a vote of thanks be tendered to Mr. FitzGerald for his Presidency over this Congress.

The Hon. Dr. Taylor (Brisbane) said he had much pleasure in seconding the vote of thanks. He had received from Mr. FitzGerald personally every courtesy and kindness, and he believed that every member of Congress could say the same. The amount of labour which the President and the Executive Officers must have bestowed in bringing this Congress to so happy an issue could be appreciated only by those who had experience of such undertakings. Undoubtedly, the Session had been an unqualified success from beginning to end. All members would leave Melbourne with feelings of complete satisfaction, and with gratitude to the President for the way in which he had fulfilled the duties of his high office.

The motion was supported by representatives of all the colonies, and was carried by acclamation.

The President said he sincerely felt the kind remarks which had been made concerning him. If he had done anything in a small way towards the success of the Congress, he should feel more than compensated by the presence of so many able men. He was not accustomed to the duties of the chair, and he owed much to the forbearance and goodness of the members of the Congress.

The Hon. Dr. Creed (Sydney) proposed a vote of thanks to the General Secretary, Professor Allen, for his invaluable services. The work which he had done would have been overwhelming to anyone less capable. Nothing had gone wrong. No other man could so thoroughly and so efficiently have filled the position. All members must join in wishing Professor Allen long life and prosperity, and hope to see him president of some future congress. As time was pressing he would join in the same vote of thanks the names of the Chairmen and Secretaries of the Sections.

Dr. J. Davies Thomas (Adelaide) said it was unnecessary to emphasise the claim of Professor Allen upon the gratitude of members. For a long time before the Congress was inaugurated, he had been working unceasingly to ensure its success.

The President referred to the enormous amount of pains and trouble which the General Secretary had taken. Speaking generally, the whole work of the Congress was on Professor Allen's shoulders, and to him its success was largely due.

The motion was put and carried unanimously.

Professor Allen said :—Mr. President, Dr. Creed, Dr. Thomas, and Gentlemen,—I thank you very much for the kind words which have been spoken, and for the kind way in which you have received them. If, unwittingly, in the press of business I have by any neglect given offence to any members, I express my sincere regret. I cannot properly acknowledge your kindness ; but I shall have much pleasure in conveying your thanks to the officers of the Sections.

Votes of thanks were also accorded to the members of the various Committees, to the hosts who had entertained the Congress, and to the Chancellor and Council of the University for their kindness in placing the University buildings at the disposal of the Congress.

ADJOURNMENT OF CONGRESS.

On the motion of Dr. Verco (Adelaide), seconded by Dr. Brownless, it was resolved that the Congress do adjourn until its next session in Sydney. The Congress then closed.

GARDEN PARTY AT RUPERTSWOOD.

After the close of the Congress, the members and other guests travelled by special trains to Sunbury, and were entertained at a garden party at Rupertswood by Sir William and Lady Clarke. The guests, who numbered about seven hundred, were received by the host and hostess, and were immediately afterwards invited to partake of lunch, which was provided in a spacious marquee. Among those present were the President of the Legislative Council (Sir James MacBain) and Lady MacBain, the Speaker of the Legislative Assembly (Mr. M. H. Davies) and Mrs. Davies, and the Executive Vice-President of the Centennial International Exhibition (Colonel Sargood) and Mrs. Sargood. During the afternoon a madrigal party discoursed on the lawn ; solos and concerted music were given in the drawingroom ; the Nordenfeldt battery went through a tournament in the fields, and a military band performed in the grounds. The visitors returned to Melbourne by special trains, reaching the city shortly after six o'clock.

MONDAY, JANUARY 14, 1889.

At the invitation of The Premier of Victoria (Mr. Gillies) and the Members of the Government, the members of Congress and other guests proceeded by train to Port Melbourne, and there embarked on the

s.s. *Courier*, by which they were conveyed to Port Phillip Heads, and then along the South Channel to Capel Sound, where H.M.V.S. *Nelson* was anchored. His Excellency the Governor went on board the *Courier* at Port Melbourne. On arriving at the Heads the visitors had the opportunity of witnessing torpedo experiments and artillery practice from the forts. The visitors, who numbered over six hundred, then passed from the *Courier* to the *Nelson*, the main deck of which was converted into a covered banquet-room. Here a sumptuous lunch was served. The healths of the Queen, the Governor, the Congress and the Ministry were drunk with enthusiasm. The party then returned to the *Courier* and were swiftly carried back to Port Melbourne.

In the evening, members were entertained by the Metropolitan Liedertafel at a Smoke-night Concert in the upper hall of the Athenæum.

TUESDAY, JANUARY 15, 1889.

At the invitation of the President of the Central Board of Health, Mr. A. P. Akehurst, a number of members visited the Quarantine Station at Point Nepean.

At the close of the Congress, the President forwarded a letter of thanks to the daily press for the excellent reports which had been published.

Dr. J. Carnegie MacMullen, of Melbourne, was empowered to represent the Auckland Branch of the New Zealand Medical Association at the Congress.

Messrs. Johnstone, O'Shannessy and Co. have undertaken to photograph Members of Congress individually, so as to prepare a group photograph, in accordance with the plan adopted in European Congresses.

During the Congress, Messrs. Burroughs, Wellcome and Co. exhibited a large special collection of their pharmaceutical preparations. Messrs. Mayer, Meltzer and Jackson also exhibited a large collection of surgical instruments.

SECTION OF MEDICINE.

PRESIDENT'S ADDRESS.

By The Hon. W. F. Taylor, M.D.

The subject which I have had the honour to have been appointed to preside over is one which embraces a vast field of research and careful critical observation. It is one which includes every science in its limits, and is in touch, as it were, with nature and the laws of nature to a very close extent. The laws which govern the universe are to the same extent the laws which are applicable to the human being. Man is composed of body, soul, and spirit, and the union of these three constitutes the *Ego* or individual being who is the subject of the physician's study, both in health and disease. In health, the being is in the perfect exercise of all his constituent parts, and may truly be said to be spiritually and physically a complete being. He exercises his various functions of nutrition, growth, mental development, and spiritual evolution. No man can be said to be in perfect health, whose spiritual being is clouded; and to him who can, whilst earnestly and faithfully discharging his duties to his fellows, cultivate his spiritual being, is vouchsafed that condition of existence which may justly be denominated the *mens sana in corpore sano.* The healing art is eminently associated with man's higher and more spiritual faculties. For centuries the *leech* and the *priest* were the same individual, and to such an exalted status was medical art raised in the time of the earlier practitioners, that a Deity was created to preside and rule over its practice. No one who has seriously considered the question, can fail to grasp the vast extent of the knowledge necessary to enable an earnest follower of Æsculapius to fathom the occult causes of disease and death, and no one can too seriously consider the conditions of our being, which give rise to such causes. We are living in a state of constant change, we ourselves are constantly changing, and the vital processes are constantly elaborating new tissue and discarding old. In such incessant alteration many causes may arise to interfere with the vital processes, and such causes may lead to effects, which may not only become permanent, but may endanger the existence of the organism. The study of the vital processes, therefore, is one which ought to form the fundamental basis for all observation and research, and those who make themselves acquainted with the life history of the

ultimate component parts of the organism, the cell development and growth thereof, are in a better position to realise the changes which may ensue from any interference with the natural condition of those parts. As each cell is as it were a miniature representation of the whole, so each cell has an autonomy which practically makes it influence the well-being of the whole, and the life history of such cell is the life history of the whole. It is evident, therefore, that so long as life lasts, so long will the condition of the being be influenced by the healthfulness or otherwise of the cellular elements which go to form it. Man is the highest and noblest work of nature, and the study of man as an individual living being is the highest and most difficult of all studies. Endowed with intellectual faculties capable of high development, and influenced in every way by his powers of reason, he is eminently fitted for the study of himself, and by such study to advance his knowledge of nature and her laws. No one can make real progress in that highest of all knowledge—the knowledge of one's self—who does not reverently and in all humility appeal to the Essence of Knowledge for guidance and support. Man is in the highest sense a progressive being, both intellectually and spiritually. Contrast the beginning or dawn of man's existence, with what is, in many cases, the close of his earthly state—the instinct of the child with the knowledge and intellectual vigour of the adult —and who can tell to what knowledge the human being may attain? We Western nations are too apt to rely on what we consider our intellectual qualities, regardless of the fact, that those qualities are the gifts of nature's God, and that the proper use of them is as much a duty incumbent upon us as the preservation of our life and health. How then should we use them, but in endeavouring to gain a knowledge of ourselves, a knowledge not only of our outward form and the manifest workings of our organism, but of the inner occult being which forms the imperishable part of the *Ego*. But some may say, how is all this to aid our diagnosis and treatment of disease? Gentlemen, no one can separate the body from the soul and spirit, in his study of the life and habits of the individual being. Everyone present must have met with many instances of the influence of mind on matter, not only in those so-called nervous conditions included under the sweeping term hysteria, but also in cases where actual alteration in the nutrition and growth of a part has resulted from mental ideas or emotions. Who has not seen the effects of the mind in cases of so-called neuralgia suddenly cured by magnetic passes made over the painful part? No doubt many such cases would have as speedily recovered under any strong mental emotion; but the quiet operation of the mind, influenced by the operator, effectually restored the disordered

condition of the nerve to its healthy state. So also the insensibility to pain when in the hypnotic state—a condition of mental rest which enables surgical operations to be performed with impunity. This condition may be termed one in which the influence of mind over matter is exercised in a very marked degree, inasmuch as it is the mind of the operator which influences the sensibility of the operated. The condition termed hypnotism, mesmerism, or animal magnetism, is one well worth the careful study of every medical practitioner. Unfortunately, the subject has generally been treated as unworthy of consideration, as one in which humbug on the one side, and credulity on the other, played the chief, if not only, part. But now-a-days, with that spirit of enquiry so distinctive of the age we live in, many medical practitioners of eminence have investigated the phenomena occurring in the hypnotic state, and some valuable results have been arrived at.

The progress in medical science during the last quarter of a century has been more remarkable in the direction of pathogeny and pathology, than in therapeutics, although in the latter branch much real advancement has been made. Whilst deploring the fact that this most important subject has not made greater strides towards combating disease, one is supported in the hope that we are now fairly launched on a new era in this respect, and that as our means of critical observation of disease and its causes become more perfect, this most necessary branch of medical science will soon emerge from the obscurity which has so long enveloped it. Our knowledge of physiology has made rapid strides of late years, and as we gain a more intimate acquaintance with the natural processes of the human economy, so shall we be in a better position to detect any departure from the condition of health, and adopt means to mitigate if not prevent the effects of such. Valuable additions have recently been made to our therapeutical resources, such as cocaine, strophanthus, antipyrin, eucalyptus, and others, and our knowledge of the action and mode of administration of the older remedies has been much increased by the researches of Ringer, Brunton, Fraser, and the observations and clinical facts constantly noted in our medical journals. But probably the greatest advancement has been made of late years in the treatment of neuroses and uterine affections by Weir Mitchell in the former, and Apostoli in the latter. The treatment by massage is not, however, of such recent date, for it is over ten years since I became acquainted with its details as first published by Weir Mitchell, but its application has now become better understood and much more general. This method of treating neurotic affections is well known, therefore it is unnecessary for me to enter into any details respecting it. I cannot refrain however from regarding the author of

massage, &c. as at present practised, as one of the greatest benefactors of humanity in our times.

Shortly after the system was first introduced, a girl about eighteen years of age came under my care, who for two years previously had vomited all food and even small quantities of water. How she lived was a mystery, as everything she swallowed appeared to be at once ejected. She had been treated by several medical men of ability and experience; and, although no apparent cause existed for the vomiting, nothing in the shape of remedial measures had any appreciable effect in even mitigating her distressing state. Feeling quite satisfied from observation that the condition was not due to ulceration of the stomach, or any other disease of that organ, I proposed, and was allowed to examine the uterus, which was found to be anteflexed with a pin hole os externum. Under the impression that this condition of the womb might probably contribute to the production of the vomiting, if it did not cause it, I performed Marion Sims' operation for division of the cervix and enlargement of the canal. This was followed by some amelioration, but not sufficient to enable food to be taken at all freely, without vomiting ensuing. I fortunately came across the first cases of treatment by massage reported in the *Lancet* by Playfair, and was so impressed with the results obtained by him that I determined to adopt it in this case. I did so, and the effect in a few days was most satisfactory. The patient could retain solid food on the fourth day, and the bowels, which before were a source of constant trouble, acted freely of their own accord. The progress towards complete restoration to health was rapid, and she is now, and has been for many years, in the enjoyment of such strength as enables her to pursue her occupation as a State School teacher. The neurotic tendency still exists, and shows itself at times by some uterine trouble, but the fact remains that this person was, by the treatment alluded to, restored from a condition of utter weakness and misery, to one of comparative strength and comfort. My experience since then has served to confirm the great value of this method in suitable cases, most if not all of which were, before its introduction, relegated to life-long misery, and to become a permanent burden on their friends.

If the boon which has been conferred on suffering humanity by the introduction of massage into medical practice has been great, that which electricity bids fair to confer is greater still. To Duchenne belongs the honour of being one of the first to drag electricity out of the hands of charlatans, and give it a distinct place in the list of remedial measures. Formerly it was looked upon with the same suspicion that is shown to animal magnetism now, and was regarded, by even the most enlightened members of the medical profession, as humbug to a great extent. But

it has emerged from the uncertainty and doubt which formerly surrounded it, and now in the hands of Apostoli has become an agent in the cure of a certain class of disease, both tractable and positive in its results. In the treatment of fibroid tumours of the uterus, it has in his hands been successful, and in such diseases as chronic endometritis and metritis it appears to be almost a specific. Its action in arresting hæmorrhage from the uterus, no matter from what cause, is both prompt and permanent, and in induration of the womb it exercises a most salutary effect in promoting absorption of the hyperplasia and in rendering the organ less sensitive and painful. It is most gratifying to know that this class of diseases is at length likely to become amenable to treatment, and that the unfortunate victims of uterine troubles are likely to be saved by this means from the unsatisfactory and painful methods of procedure hitherto in vogue. And who can foretell where the use of this agent in the treatment of diseases will end! So with animal electricity or magnetism. At present relegated to persons having little or no scientific knowledge, the time will, I believe, soon come when its use will be clearly demonstrated by some member of the profession. Already it has been proposed to use hypnotism in midwifery, and in France it has been actually employed instead of chloroform in such cases.

The physician is called upon to treat many diseases resulting from over indulgence in alcoholic stimulants, and he is brought into frequent contact with those vices which owe their origin to habits of drinking. Insanity is a common result of these habits, and our lunatic asylums contain many examples of such cases. It is not to be supposed that the medical practitioner should become a temperance lecturer, but he may do much to stay the rapid progress that is being made in the habits of intemperance, which lead to such sad results. In these colonies where wealth is so easily obtained, and where the pursuit of it occupies so much time, to the exclusion of the cultivation of a taste for art and science, time is apt to hang heavily on the hands of those who, having acquired riches, or having inherited them, find no necessity for occupying their minds with business, and so are apt to indulge in habits of drinking from having nothing absolutely to do. The following appears among the editorial notes in the *Lancet* of December 24, 1887:—"We have lately remarked with pain on the drinking habits of some of our colonies, notably New South Wales. A Royal Commission has been occupied for many months in taking evidence on this subject, and arrives at conclusions which should excite the concern of every inhabitant of the colony. The premier colony has the distinction of drinking more intoxicating drink, and that of a worse quality, than almost any other English-speaking community in the world. This is a bad distinction, which the following figures seem to

confirm. The drink bill of the United States per head is £1 13s. 6d.; of New Zealand, £3; of the United Kingdom, £3 7s. 10d.; of Victoria, £4 13s. 11d.; of New South Wales, £5 14s. In the city of Sydney alone, there are said to be 3000 persons known to be habitual and absolutely hopeless drunkards. We are informed that not only does the colony drink more than other similar communities, but that it drinks much more than it did twenty years ago," &c., &c. It is a great pity that our universities are not more attended by the youth of these colonies, for it is only by that higher education which induces an inclination for science, art, or literature, that any real stand can be made against the evil mentioned, an evil which is ever growing with increased wealth and population. In the mother country, where a university career affords a certain social distinction, it is very much the practice for the wealthy to send their sons to college, where if not very much is learnt by the student, he is brought under restraining influences and a certain amount of discipline, at a period of life when habits are more easily formed, and the mind more readily bent than at any other time. It is our duty as medical practitioners, having by reason of the nature of our profession opportunities of coming into close contact with the inner life of the community, to endeavour to point out to parents the advantages which accrue from a University career, and the dangers which such a career may save their sons from. In the mother country wealth brings with it certain responsibilities, the neglect of which condemns the individual to social exile, and that, in a country where the struggle is as much after social position as after wealth, is regarded with feelings of dismay. A social system, which makes such strong class distinctions as that of Great Britain and Ireland, is not to be thought of here, and no one having the well-being of the community at heart would wish to see such established. What we should aim at is to create an aristocracy of intellect, the passport to which would be a cultivated mind, and a high sense of duty to one's self and one's fellowman. It should be our aim, therefore, to encourage any movement which may have for its object the promotion of means for furthering the higher education of the youth of both sexes, and for enabling those who may display an inclination for scientific and literary pursuits to follow out their desires to the fullest extent. In all walks of life may be found genius, talent, and a high order of intellect, and it should be our aim to bring about such a state of things as will enable the son of the humblest member of the community to cultivate the talents with which God has endowed him. Genius and talent are as much the property of the whole community as of any one individual member thereof, and it is as much the duty of the community to cultivate that genius and talent, as it is of the individual himself.

The part which bacterial organisms play in the production of disease is daily becoming more clearly understood, and the time is, I believe, fast approaching, when our knowledge of the habits and life history of micro-parasites will enable us to mitigate, if not to prevent, their pathogenic action in the human being. Already, it has been pretty clearly demonstrated that certain diseases, such as woolsorters' disease, malignant pustule, and intestinal anthrax, are caused by the anthrax bacillus. Micrococci are said to be associated with pyæmia and all acute suppurations, erysipelas, diphtheria, measles, vaccinia, typhus, scarlatina, variola, whooping cough, dysentery, pneumonia, epidemic cerebro-spinal meningitis, infective periostitis, endocarditis, and acute yellow atrophy of the liver. Bacilli are found in connection with cholera, malaria, typhoid fever, tubercle, leprosy, and glanders; and relapsing fever no doubt owes its cause to spirillum, or spirochaete Obermeieri. The colourless blood cells appear, from the observations of Metschnikoff, to resist the invasion of these micro-organisms, and cases of immunity from disease after exposure of the individual to contagion, are supposed to be due to the successful action of the leucocytes. With reference to the bacillus of anthrax, Metschnikoff says "that the virulent rods, when introduced by inoculation into an animal liable to take the fever, such as a rodent, were not absorbed by the blood cells, or only in exceptional instances, they were readily absorbed by the blood cells of animals not liable to the disease, as frogs and lizards, provided the temperature was not artificially raised, and then disappeared inside the cells. The same thing happened when susceptible animals were inoculated with bacillus anthracis which had been attenuated to the harmless state." He infers "that the bacillus is harmless, because it is absorbed and destroyed by the blood cells, and injurious because this does not happen; or at least that it becomes harmless, if the destruction by the blood cells takes place more rapidly, and to a greater extent, than the growth and multiplication of the bacillus; the converse being also true." Cheyne says:—"When bacteria are injected into the tissues, there follows a struggle for existence between them and the cellular elements. Leucocytes quickly accumulate in the neighbourhood of the mass of bacteria, and then follows a fight for the mastery between these cells and the bacteria. The cells take up the bacteria into their interior, and when the bacteria are non-pathogenic for the animal employed they are destroyed." It would appear, therefore, that if from any cause the vitality of the blood-cells be lowered, the bacilli will grow and enter the blood-stream, and, in the case of pathogenic bacteria, will give rise to certain pathological results. Dr. P. W. Latham, in the Harveian Oration delivered before the Royal College of Physicians on October 18, last, says:—"From the data which I have placed before you I wish to

draw the inference that, in the living animal organisms, owing to slight departures from the normal nutrition of parts, arising probably through nervous agency—the trophic nerves—various substances such as extractives or alkaloids will be produced which, if not eliminated or neutralised, will lead to pathological changes in the system, absolutely and entirely independently of any bacterial action. If, then, from any cause due to glandular, nervous, or other derangement in the system, these poisonous substances are developed or not eliminated, they will alter the composition and constitution of the blood ; the white corpuscles may be destroyed, or their movements enfeebled, and by any such changes the blood, which previously could resist the attacks of the various parasitic micro-organisms, is so modified as to render it a suitable soil in which these organisms may develop and thrive." Dr. Latham advances the theory that non-pathogenic micro-organisms may, under suitable conditions, develop pathogenic properties, and gives some very strong proof in support of this view. He mentions the fact that "Instances are not rare of vegetable cells possessing poisonous properties at one time and not at another. Naegeli has called attention to one of the most striking, which is thus described by De Bary :— 'The bitter almond tree is poisonous from the amount of amygdalin it contains, though it is not very dangerous to human beings ; the sweet almond contains no amygdalin, and is not poisonous. The sweet almond tree does not differ specifically from the bitter ; a tree with bitter seeds may be produced from a sweet seed ; bitter and sweet seeds may even be borne on the same tree in flowers and fruits not morphologically distinguishable from each other.' What the origin or cause of this difference is, has not yet been discovered, and no explanation can as yet be offered ; but the fact will help us to understand that cells may be developed by these micro-organisms, capable of producing very different effects upon the system ; and I incline therefore to the view that, probably from the simple neglect of ordinary sanitary measures, innocuous micro-organisms may become virulent, and that diseases may arise *de novo*." Time will not permit me to refer at greater length to these micro-organisms, nor to their connection, either as to cause or effect, with the ptomaines and leucomaines of Gautier, Selmi, and Brieger ; but I think that the obvious conclusions to be drawn from what is known with respect to them is, that we must rely on hygienic rather than on medicinal means to combat their effects on the human economy, that our efforts must be directed to fortifying the system to resist the attacks of these insidious foes, rather than to rely on curative measures to nullify the effects of their presence in the blood or organs of the body. Dr. Green, in his work on "Pathology and Morbid Anatomy,"

says :—"Attention to general hygiene is the only way at present known to prevent invasion of the system by fungi which cause 'medical' diseases. Once organisms have gained access to the tissues, it is extremely difficult to destroy them without also destroying the tissues. Improvement of the general health probably often enables the tissue elements successfully to resist invasion." In the case of disease, therefore, arising from the introduction of micro-parasites into the human system, the action of medicines must be limited to their physiological effects on the organism—their stimulating and tonic effects on the nerves, blood, and cellular elements—and not on any supposed therapeutic action. Preventive medicine, then, appears to afford the only satisfactory means of defending the organism from the inroads of disease, and of rendering its surroundings less liable to generate or promote the propagation of the specific virus of disease. Hygiene, in every sense of the term, must take the place of curative medicine to a great extent, and in time we may see real cities develop after the model of Richardson's ideal Hygeia.

But a glance at the vital statistics of each colony will speedily dispel any hope that such a consummation is at all likely to be arrived at in the near future of Australia; for we find that the mortality from preventable diseases was as great during 1887, if not greater, than in any year during the previous ten; and the deaths of children under five years have, in the case of Queensland, steadily increased during the four years from 1884 to 1887, the proportion per cent of such to the total deaths in the colony being, in 1884, 33·95; 1885, 38·80; 1886, 41·26; 1887, 41·35. In New South Wales the proportion per cent. was in 1884, 43·79; 1885, 43·26; 1886, 43·15; 1887, 41·67. In Victoria the proportion per cent. was in 1884, 35·87; 1885, 36·07; 1886 not received; 1887, 36·90; and in South Australia the proportion per cent. was in 1884, 48·59.

The Registrar-General of Queensland draws forcible attention to the mortality amongst children of infantile years, which, he says, "is a matter of widespread importance, especially to young countries like Queensland, where the increase of population is an important factor in its prosperity, and where there is a high marriage and birth rate." 2136 children under five years of age died in 1887, and of this number 1856 were under two years old. Perhaps I cannot do better than quote at length the Registrar-General's remarks. Referring to Table xiv. of the Report, he says:—"This shows that out of a total of 2136 deaths, 1668 children under five years died from the diseases mentioned, and it is a matter of serious consideration whether in many cases the diseases specified were not brought about by the administration of improper food to the children, by want of care, or by

injudicious exposure of the children by those in whose care they are placed. The whole subject is fraught with interest to the community, and is one which should receive early attention from medical men and others, with a view to devise means by which at least a portion of the large annual loss of life amongst our juvenile population might be prevented."

However, gentlemen, it is not my province to discuss fully the many causes which may operate to bring about this great mortality among our infant population. That is a point which can only be satisfactorily elucidated by some combined action on your part, and I trust that before this Conference terminates, some steps will be taken to bring about such action, so that we may each succeeding year be in a better position to grapple with this momentous question. I have not been able to obtain any returns of deaths of children under five years, occurring in England and Wales since 1884, but that year the proportion per cent. of the total deaths was 23·04, as against 33·95 Queensland, 35·87 Victoria, 48·59 South Australia. Surely some special reasons must exist to account for this large mortality in Australia, over that in England and Wales, other than that referred to?

There are other subjects of scarcely less importance which, I trust, will occupy the attention of this Section, such as the prevalence of typhoid fever, diphtheria, phthisis, and the gradual increase in the number of deaths from cancer. The first two being decidedly preventable diseases, the numerous deaths from them year after year does not reflect much credit on the sanitary condition of these colonies. It is amazing to witness the stolid apathy of governments and local authorities, with respect to the all-important matter of sanitation. So long as such diseases as small-pox and cholera can be kept out by rigid quarantine, little or no heed is taken of the unhealthy state of our cities and towns, and of the numbers who perish annually from diseases which, under proper hygienic conditions, would not exist. The constant cry of each colony is for increase of population, and large sums are annually spent by some of them to obtain such increase. But little or no care is taken, by either governments or local authorities, to preserve the lives and health of those already in the country, beyond enforcing arbitrary and harsh quarantine regulations, and making the cities and towns reek with foul-smelling so-called disinfectants, whenever a small-pox or cholera scare arises. In the meantime, the people are lulled into a state of complacency, and congratulate themselves that their representatives, both in parliament and the municipal councils have by quarantine and disinfectants saved them from small-pox or cholera; but seem to think that *typhoid fever* and *diphtheria* stalk unchecked amongst them by the special will of Providence, and therefore ought not to be interfered with. Surely it is high time that a little common sense in matters sanitary were infused

into our governing bodies, and that the free expression of the views of aspirants for political or municipal honors respecting such matters should be required by the electors. Nature has done much for this country, and in its climatic conditions has been especially bountiful, in providing a sanitary measure of extreme importance, in the hot dry winds which prevail at a season of the year when disease-spreading germs are most active. These hot winds perform the duty of scavengers in an efficient manner by drying up effete organic matter, and thereby doing away with one of the conditions necessary to the development of pathogenic organisms. But there is a limit even to Nature's beneficence, which, when reached, may render man's carelessness disastrous in the extreme. That innocuous micro-organisms may, under suitable conditions, develop into disease-producing germs, is at least probable, and it is also probable that such organisms, capable of developing the specific virus of cholera in all its virulency, may be constantly in our midst. How then can we maintain our lurking foe harmless, but by strict intelligent application of well-known sanitary facts? Dr. Buchanan says that the sanitary arrangements of Great Britain are sufficient to stamp out cholera should it break out in that country; are the sanitary arrangements of Australia capable of dealing with this fell disease in a similar manner.

Man is the sum of ever-changing conditions, both internally and externally. His mind is formed by impressions conveyed to his brain by the senses, and his intellectual development is caused by the circumstances of his surroundings. No one of God's creatures is so affected by early influences or conditions; and so great are those causes in making or marring his mental attributes, that one is led to infer that man is not a free agent, but merely the result of his surroundings. But I would point out that no matter how sunk in ignorance and crime a fellow-being may be, we should not condemn him absolutely, but rather pity him for not having had those opportunities of developing his mental and moral attributes, which would raise him above his present condition of degradation. It is a very gratifying fact to contemplate that the medical practitioner regards all suffering humanity as fit objects for his sympathy and care, and bestows as much skill and attention on the uncultivated savage as on the highly endowed intellectual sample of modern civilisation. What calling can be nobler than that of alleviating pain and sickness wherever found? and who can claim more usefulness in doing good than the conscientious medical practitioner?

In all countries, and under all conditions, the work of alleviating human suffering is incessantly going on, and to those engaged in such work all honour and praise are due. May we continue steadfast in our efforts, and may we have the satisfaction of feeling, when our earthly career terminates, that we have done our duty to our fellow man.

SOME NOTES ON DISEASE IN BRITISH NEW GUINEA.

By Sir William McGregor, M.D., K.C.M.G.

During the three months I have been in British New Guinea, so many subjects of importance have come under consideration, that I have been unable to devote much time to medical subjects ; but the few rough notes below, incomplete and unpretentious as they are, may be of some interest to those that study the distribution of disease.

The first disease that came under my notice in British New Guinea was :—

Tinea Desquamans.—This malady, known in some places as Tokolau, or Solomon Island Ringworm, was named *tinea desquamans* by Dr. Turner, late of Samoa, who had ample opportunity of studying the disease there. Many thousands of cases of this ringworm have come under my observation, and I deem the name given to it by Dr. Turner to be appropriate, and it is therefore used in these notes. My first acquaintance with *tinea desquamans* was made in Fiji, where the disease was unknown until within recent years. It came to Fiji, however, with imported plantation labourers from two different quarters, from the Line Islands, and from the Solomon Islands, and the result is that the disease has become domesticated in that colony, and been sown all over the New Hebrides, by labourers, who have caught it from fellow-labourers in Fiji, and taken it home with them. Fiji is not to blame solely for this distribution of *tinea desquamans*, as Solomon Islanders and natives of the New Hebrides have been employed to work together on plantations in Samoa, Queensland, and elsewhere.

It is my misfortune to have to witness the further distribution of this loathsome malady in this part of the world. When I had been a few days at Port Moresby, I noticed a man covered with this form of ringworm, and on making inquiry, I was told he came from a place on the coast about thirty miles to the eastward. It appeared that there was only one case of the disease in a native of Port Moresby, that the Port Moresby people knew it to be contagious, but they were not afraid of it, as it had been long to the east of them, and they had not got it. They assured me it had not got to the west of them, and that it does not exist inland.

At a day's journey eastward of Port Moresby, there were three cases in the village where we camped. During the second and third days' journey in the same direction it gradually became more frequent, and fifty or sixty miles east of Port Moresby, the disease is common, affecting probably from a fourth to a half of the population. I have not been on the portion of the mainland that lies between the east end of the island and a point about seventy miles east of Port Moresby, but have seen that a very large proportion, probably fifty per cent. of the inhabitants of the coast along the north-west end of the mainland, suffer from it. It is not less common in the Louisiade and D'Entrecasteaux groups of islands. The natives dislike the disease, but make no efforts,

so far as I have seen, to cure or control it. It is much to be feared that it is only a question of time, when it will be distributed over the whole of New Guinea. At Port Moresby, *tinea desquamans* is called by the natives "hekopa," that is, "excoriated." From thirty to seventy miles eastward, it is generally known as "lebo," "lebu," or "lewe," or by some dialectic modification of this name. On the east end of New Guinea it is named "sīpŏăm," or "sīpōmā," a name applied to it, with local differences of pronunciation, all over the great islands of the Louisiade and D'Entrecasteaux Groups. This name may probably throw light on the introduction of the disease into the islands and mainland of the Possession, as it is used where many diverse languages are spoken, and may therefore be supposed to have been introduced along with the disease. The probability is that no efforts that can be made will be sufficient to stop the further extension of this fell disease, which disfigures a clotheless race, and renders the unfortunate individual suffering from it very uncomfortable, besides entailing on him at times a certain amount of social disqualification; for example, young women not affected by *tinea desquamans* sometimes refuse to marry men suffering from it. A few weeks ago, when inspecting the island of Ferguson, my party explored a large bay, on which is a flat several square miles in area, containing hundreds, if not thousands, of small fuming vents, from which volatilised sulphur is constantly arising, depositing pure sublimed sulphur; in the same locality are hot springs giving off sulphurous vapours. Here then is a remedy close at hand for the treatment of *tinea desquamans*, but to take advantage of this, time, patience, and control over the natives is required, in order to get them to bathe in the fumes and sulphur springs of Seymour Bay; and the chances are that those that will ever be cured there will be only few in number, although there is ample material in the bay to extinguish the disease all over the Possession.

Yaws constitute the first disease that one is likely to notice in British New Guinea, in those places not yet invaded by *tinea desquamans.*. This disease is indigenous in the Solomon Islands, the New Hebrides, Samoa, Tonga, Fiji, and the islands adjacent. It was unknown, however, to the Line Islanders, until they got infected by it on plantations in countries employing foreign labourers among a native population, where the disease is endemic. The natives of British New Guinea say they have always had this disease, but they think nothing of it. It seems, in reality, to be of an extremely mild character here, one rarely seeing any sore on those affected by it, beyond the usual pathognomonic superficial ulceration at the corners of the mouth. So mild is the disease, that in many large towns I have hardly noticed an example of it at all, without close inspection. But here, as in other countries, where the disease is endemic, all young children suffer from it once; but I am assured that it generally lasts only two or three months, and creates in the majority of cases no constitutional disturbance. Occasionally, however, according to native accounts, "the disease goes inward, and then the child dies." I have heard of no treatment being used for it by the natives, and they appear to be indifferent as to whether their children contract it or not, and they do not seem to think, as some other people do, that it is necessary to have the disease once, in order to be healthy afterwards.

Tinea circinata and *chloasma* are occasionally met with, but they are not common. They are known by separate names in certain places, but in other districts are not distinguished. and are called by the same name. No treatment is used for either.

Itch, caused by the ordinary acarus scabiei, is not a common disease among the natives here, in fact, I have seen only a very few doubtful cases. Europeans suffer much in certain districts, however, from scrub itch, which is a very irritating and annoying disease.

Leprosy in any form is rare. I have seen only about half a dozen cases among all the natives I have as yet visited. The type of the disease met with here seems to be very similar to that occurring in Polynesia, which is mild and chronic, compared to the malign tubercular form I was accustomed to in the Seychelles Islands.

Elephantiasis is not more common than leprosy, only one severe case having come under notice. It is certainly less common here than in Polynesia, but the natives of the Possession are much more judicious than Polynesians in selecting sites for their villages, which probably has something to do with their comparative immunity from this disease, and with their freedom from phthisis pulmonalis, which is certainly not of frequent occurrence, as I have met with only four or five well marked cases. As a rule, the natives of those parts of the Possession that I have seen build their houses on dry, stony, narrow ridges, from which there is perfect drainage ; then the floor of the house stands on posts never less than five feet high. The houses built high up in trees, so often seen in photographs of New Guinea scenery, are rarities, so exceptional that they need not be taken into account in this connection ; but the dwellinghouses, as actually constructed, are admirably suited to avoid the evil effects of damp sites, &c., in producing and developing chest disease.

Dysentery—that scourge of the tropics—I have not, as yet, met with in New Guinea. This disease I have long regarded as contagious, and as being the greatest cause of mortality among the coloured races I have been brought into contact with, and I therefore consider that we are very fortunate in possessing here what seems to be almost exemption from it.

Ophthalmia, of the contagious kind, common at several places in the Pacific, I have not so far observed in New Guinea. It is quite rare to meet a native here who has lost an eye from ophthalmia, or who has a spot of leucoma on the cornea. In this connection, it might be mentioned that there is little or no venereal disease among the natives, a coincidence that goes some way to strengthen a suspicion I have entertained that the contagious ophthalmia so common in Fiji, for example, may have had gonorrhœal matter for its inception. At all events, I have seen no case of gonorrhœa, and no case of severe ophthalmia in New Guinea. Of course, with the recent influx of Europeans, venereal disease will in all human probability have been imported and communicated to natives. But I do not know how this could be prevented.

Fever is the bug-bear of British New Guinea, but of this disease I have fortunately seen so little that I am not in a position to speak of it. The few cases I have seen have had the character of simple continued

fever, but attended with much prostration, headache, and irritability of the stomach. The natives do not appear to suffer much from it, but then they, as already pointed out, generally avoid building on low wet ground, and seem to keep in their houses at night.

So far as I am able to judge, the natives of New Guinea are at present a healthy race, and there are, with the exception of fever, no serious diseases from which Europeans are likely to suffer great inconvenience; but then it must be remembered that I have not as yet been in the interior of the country, which would of course be much more interesting ground than the coast.

ON FILARIA.

By Dr. Joseph Bancroft, Brisbane.

I am asked by my good friend Professor Allen to contribute to the history of filaria and allied diseases of a parasitic nature in Australia, and I put my hand to paper feeling how imperfect the investigations are, and how much is needed to be searched into, before the various bearings of blood-parasitism, as a cause of disease, can be in any small degree understood.

It will be much easier to indicate the standing timber that may fall as a harvest to the inquiring student, than to expatiate on the limited fields cleared by the pioneers in this branch of knowledge; but sufficient has been done by Lewis and Cobbold, now retired to their rest, by Manson and our South American investigators, still struggling with a difficult problem, to encourage our youthful naturalists to work at the subject of blood-parasitism, not merely as it afflicts the human race, but in the wide field of animal life, as there can be little doubt the more extensively the work is prosecuted, the clearer will be our views as to the measures necessary for human sanitation.

The subject after a time becomes an interesting study, more fascinating, if possible, than diatomes, and is intimately bound up with the welfare of ourselves and our animal friends.

Few things fill the mind with greater surprise than the discovery that the heart of our faithful dog is so filled with worms that his life cannot be expected to last long. On examining a drop of blood of a dog, we can ascertain by the presence of filariæ whether such is the case; and if we find it necessary to sacrifice our servant, we shall discover in the right side of the heart, and in the pulmonary artery, worms from four to ten inches long, more or less, interfering with the circulation of the blood, leading to dyspnœa, fatness and dropsy.

Filariæ, whose embryos float in the blood, may in all cases require the intervention of some blood-sucking creature to assist in their distribution, mosquito, sand-fly, louse, or flea, all of which will need to be examined.

With regard to the dog, the study of which is very convenient, as he is always at hand, much information has yet to be got. Some years ago, I found the louse of the dog with its meal of blood, and in the blood the embryos of Filaria immitis. This information was communicated to the Queckett Microscopic Club by Dr. Cobbold in February 1880. Dr.

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Prospero Sonsino, of Pisa, whose researches on blood parasites in Egypt are so well known, in a recent letter reminds me of the communication, and is anxious to gain any further information obtainable in our country with regard to this filaria.

The dipteron Stomoxys calcitrans also absorbs with the dog's blood the embryo worms. Of these, I once counted fifty-nine in one insect. The stomoxys-fly, distended with blood, it is not difficult to capture on sunny walls. It may be distinguished from the common house-fly by the set of its wings, more divergent posteriorly, and lying with their tips resting on the wall. When captured, the sharp penetrating beak at once confirms its generic title.

These flies are a great annoyance to horses in summer, gorging themselves with their blood, but I never found filariæ taken up, except in the instance referred to, and then I had seen the fly feed on the dog. Dogs clean themselves of fleas and lice by biting, and so probably acquire the parasite; they frequently also snap at flies. Feeding experiments with various insects, containing blood, are however wanting, to trace the life history of the parasite; and from careful scrutiny, knowledge may be gained that would be of the greatest help in understanding what is wanted to arrive at the history of the human filaria.

The embryo of F. immitis has no sheath, and is more active than the embryo of F. sanguinis hominis.

In dissecting dogs known to have embryos in their blood, the portal circulation should be searched, in case the parent worms, not being found in the heart, are obstructed in their progress by the capillaries of the liver. When F. immitis is extracted from the heart, and placed in a vessel of blood or blood-serum, it writhes about with a slow motion, and as the coils rise above the level of the liquid, they appear pure white, as if greasy. A dead or injured worm rapidly becomes stained red. The worms have much rigidity while alive, and at times cause the death of their bearer, by rupture of the ventricle when hunting. There is no history of the filaria of the dog living in the human subject.

I have examined the blood of many dogs belonging to the aborigines of this colony, but failed to find the parasite.* It has yet to be determined if the embryos of F. immitis observe the periodicity in activity, shown by Manson to obtain in F. sanguinis hominis.

In the sheaths of the tendons and bursæ, about the knee joint of the great kangaroo, there are often found worms as large as those in the dog, but not of such rigid texture. They are easily seen when the hind-quarters are skinned. The embryos of this worm never, so far as I have examined, enter the blood-vessels, but are plentiful in the synovial secretions of the bursæ inhabited. How the embryos are transferred from their resting place is not known; but I would expect that the mosquito, probably the large grey sort, has the power of penetrating into the bursæ with its piercer. The ease with which the mosquito penetrates our trousers when tight over the knee, would indicate the possibility of this being the case, as the kangaroo sits with the integuments tense over the knee joint. The parasitic fly, that lives among the hair of the kangaroo, may play some part in the life history of this worm. None of the smaller species of kangaroo in this neighbourhood have any worms near the knee.

* Since found in the blood of blackfellows' dogs, June 1889.

I have often heard it mentioned that fishes in some parts of Australia have worms in their flesh, and that after cutting a fish in pieces, and leaving them on a plate all night, the worms may be found crept out of the muscles in the morning. I have not seen an instance of this parasite, but am told that fresh-water fishes near Melbourne are so affected. Some student at your University might undertake the inquiry.

The resting place of the mature filaria in the human body is hard to determine. It is found in the lymphatics of the arm; there, dying probably from bruises or the excessive muscular action of the labourer, it forms an abscess, the structure involved becoming brawny and tumid. Rigors mostly occur. If the abscess is opened early, the parasite may be perceived, more or less broken and undergoing disintegration; the embryos, also dead, escaping from the ruptured ovarian tubes.

The particulars of the discovery of the first parent filaria sanguinis hominis, were published in the Proceedings of the Pathological Society of London, in Vol. 29, A.D. 1878, but as access to this work is not easy, I will repeat briefly some of the circumstances.

In this colony, the embryo worms in the blood were first found in Ipswich by the late Dr. Thomas Rowlands, by following the researches of Lewis, of Calcutta. Dr. Jno. Mullen was the first practitioner to discover a case of chyluria in Brisbane. A case of chyluria happened to be under my care when Dr. Rowlands informed me of the observations of Lewis. This was in December 1874. A few days later I observed the parasite in my patient's blood. Specimens in blood and in glycerine were sent to Dr. William Roberts of Manchester, in 1874, and subsequently in 1875, with a request to interest Dr. Cobbold in the inquiry. Dr. Cobbold examined the tubes of blood in May 1876, and published this statement:—"There cannot, I think, be much doubt as to the identity of all these sexually immature nematoids."—See *British Medical Journal*, June 24, 1876.

I received this on September 28th, 1876.

Then there must be a parent worm to be found, but where? Reading up the history of filaria medinensis, of which I had no practical acquaintance, it is recorded that Guinea-worms, when not extracted with care, form abscesses. I had by this time found several cases of filaria disease, and had gathered some record of those patients suffering from abscesses. I resolved therefore, on receipt of Dr. Cobbold's communication, to carefully examine all abscesses my patients might have. This I did, without finding anything until December 21, 1876, when I opened an abscess in the arm of a youth employed as a butcher. I collected the matter as usual in a small vessel. As a preliminary inquiry, the blood had to be inspected for embryonic filariæ. This was the second case in which the blood contained the parasite in question, but in the former the abscess, which was an old steatoma, gave negative results. On examining the matter in the present case, a thread-like body came in view. Under the microscope it was without doubt a worm, and embryos were seen coming out of its body.

On March 21, the following year, I tapped a hydrocele, in an elderly patient, with a trochar and canula combined, which I had made by McLennan, our surgical instrument maker. On withdrawing, a lash of hair-like bodies was caught in the eyes of the instrument. At once suspecting their real nature, I put them in the hydrocele fluid, when they began to move about with great activity. Embryos in abundance were found in the hydrocele fluid, and in the patient's blood. My friend, Dr. Mullen, I sent for to see the live worms. I kept them for over a day, during which time they remained entangled. On immersing them in pure water they stretched out and became quiet, on restoring them to the hydrocele fluid they recovered their activity. Uncoiling them in fresh water occupied me over an hour. The specimens were now transmitted to Dr. Cobbold, with a communication, which appeared in the *Lancet* of July 14, 1877, p. 70.

In the *Lancet* of September 29, 1877, Dr. Timothy Lewis records dissecting an elephantoid tumour, removed by Dr. Gayer, on August 7 of the same year, from a young Bengalee in Calcutta, and after eight hours' search discovering in a blood-clot the adult filaria, thus verifying my belief, previously published, that the filaria would prove to be the cause of such growths.

In the *Lancet* of October 6, 1877, Dr. Cobbold's drawings of the parasites transmitted from Australia appeared, showing the sexual organ of the female parasite.

Many adult filariæ have since been found, but recently Dr. Pedro S. de Magalhaes has kindly sent me an account of two parasites having been found by Dr. Saboia in the right side of the heart of a boy who died in the Hospital Misericordia of Bahia. The disease from which the patient died is not mentioned. The worms are very ably figured, after comparison with the drawings of Lewis and Cobbold ; one is a female, the other a male, the latter having a spiral tail similar to that of Filaria immitis. This is the first time the male parasite has been described. Dr. Magalhaes also draws a peculiar band running along the body of the female, an appearance recorded in my first unpublished drawings. I have also among them the sexual organ of the female, near the head, the significance of which was not apparent to me when the drawing was first made. I have to thank Mr. Birkbeck of the Railway department for aid in translating the Portugese—*Gazeta Medica da Bahia*, No. 3 de Setembro de 1886 ; also paper on the same by the Faculty of Medicine of Rio de Janeiro, No. 3, 1886.

The pathological conditions produced in the human subject by filariæ are numerous. The movements of the embryos in the blood do not appear to inflict injury. Dr. Manson has studied this subject with great care, and showed the further development of the embryos in the intestines of mosquitos—see *Linnæan Society's Transactions*, March 1884, and in previous papers in 1877 and 1878—also the greater activity of the embryos in the evening.

Dr. W. W. Myers, of Shanghai, shows that the normal evening rise of temperature of the human body may account for the greater activity of the nematoids. How the parasite passes from the mosquito to the human subject has not been satisfactorily traced, though it is likely that it is drunk in water.

The fact that few cases of youth suffering from filaria in Brisbane are now to be found, seems to show that the city water-supply is purer than the well and tank water formerly used. The new cases presenting themselves in Brisbane are from country towns, where there is no public supply of drinking-water.

The adult parasite probably, by its presence in the lymphatics, blocks them up, either by its own bulk, or by the inflammation it may cause. If located in the heart and blood-vessels, as in the Bahia case, thrombosis and embolism may happen. Little information is to hand on this point. When the parasites live in a hydrocele, no harm can follow. My patient, whose hydrocele contained four worms, was not free from embryos in his blood for years after, showing that all the adult worms were not removed from his body. Suppose the parent worms are in the structures of the arm, a common occurrence, the disease manifests itself, and is recognisable, by rigors and abscesses. Cases that suffered in this way are now in fair health, others are weakly, but able to work with feeble circulation.

Elephantoid growths and limbs do not develope in Brisbane. It is not easy to account for this. People are better fed here than in India, and the climate may be more salubrious. One patient here has intense scleroderma of the head, arms, and upper part of the body; but now, after some years, the skin is becoming softer, and embryos are no longer to be found in the blood. How could the lymphatics be blocked with adult parasites, so as to cause this hardness of the integuments of the head and shoulders?

Chyluria and elastic tumours in the groin are associated. When the tumours are evacuated, an operation not easy of execution, as the sac is very difficult to pierce by trochar, they yield chyle, containing a very small amount of blood, which deposits itself in the bottom of the receiver after some hours. The blood is very bright, and seems to differ from ordinary blood. May it be blood in a state of development? When urine becomes chylous, the elastic tumours, if present, lose their tension. These elastic chyle-sacs, emptied of their contents and injected with iodine, will solidify and close up. It is rather a perilous operation, as the sac is partly intra-abdominal, and there is danger of peritonitis. A patient, cured of these tumours by injection, afterwards suffered from chyluria. A better course is to use a double truss, with concave pads. A case so treated is now cured, and no embryos have been seen in the blood for two years.

Chyluria is sometimes so severe as to threaten death from exhaustion. A chyluric patient was confined of a living child, the chyle and blood discharged from the bladder was in great abundance. She became so weak as to faint on the head being raised. Hæmostatic remedies did no good. A fatal issue being anticipated, I injected the bladder with tartrate of iron and port wine. After two injections, the discharge ceased and the patient recovered.

Lymph vesicle on the skin of the leg or scrotum seems related to chyluria. The lymph discharge is intermittent, so is the chyluria. At times it is scarcely possible to find the minute aperture on the scrotum which discharges the lymph. From this I had one patient die, with epistaxis and frequently recurring rigors. It seems to me that in chyluria

the aperture which gives out the chyle is a lymph vesicle on the walls of the bladder. It would be difficult to verify this conclusion, even post mortem, and the presence of parent worms among the pelvic lymphatics would be hard to find.

At the Medical Schools of India it ought to be possible to obtain bodies of patients, known to suffer from filaria diseases, for their dissecting rooms. Preparations, showing the enlargements and varicosities of the lymphatic system, could thus be made, tracing to their true cause these abnormal conditions.

BERI-BERI AS SEEN IN THE NORTHERN TERRITORY OF SOUTH AUSTRALIA.

By Dr. Percy Moore Wood, Palmerston, Northern Territory.

As I have reason to think that this is probably the first time that attention has been drawn to this disease in Australia, by one who can speak from personal observation, I trust this short paper may not be without interest to you.

Owing to the great difficulties under which I have laboured, such as visiting the patients in miserable huts, the patients being oft-times very poor, and nearly always destitute of any knowledge of English, the interpreters too being often grossly inaccurate ; the distance from medical centres of knowledge being so great as to preclude the chance of keeping up with the latest investigations of this disease ; the insufficiency of ward space in the local hospital, preventing me from taking in any but the very severe cases ; and finally, the rapid decomposition that takes place in this climate, preventing any satisfactory microscopical work by a busy man ; I am aware that what I write may, in a measure, lack the scientific value it would have had if circumstances had been different.

The authorities that I have with me are Dr. Maclean, on "Tropical Diseases;" Sir Joseph Fayrer, on "Beri-Beri" in "Quain's Dictionary of Medicine ;" and Dr. Broadbent's edition of Dr. Tanner's "Medicine," a short account of this disease from the pen of Dr. Aitken.

History of the Disease.

I have reason to think that it was during the years 1879 and 1880 that this disease first became endemic in the Territory, as, on referring to the death register book, I notice that a great many deaths were during that period registered under the headings of dropsy and paralysis. These deaths all occurred among the Chinese, who were young men, generally under thirty years of age, and never seen by a medical man, but the record of death was simply given to the Registrar officially by a trooper. The place where these deaths chiefly occurred was Pine Creek, but some apparently took place at Palmerston. This opinion is strengthened by the fact that I have shown some of my patients to Europeans, who were resident in this country during 1879 and 1880,

and they think that the cases look similar; but what appears to strike them most is the way that the convalescents at both outbreaks walk.

About two years ago, there was a small but fatal outbreak of this disease in the gaol here, among the aboriginals. Seven were attacked, three severely. Of these, two died; the rest recovered. The reason I mention this occurrence is, that a few weeks before, the aborigines had been placed on Chinese diet, which means rice instead of bread, and half the quantity of fresh meat, and during that time there was a scarcity of fresh potatoes. The Chinese did not suffer at this time, and in fact throve very well on the diet allowed them in the gaol. I could find no other cause but the change of diet, so replaced them on the European scale, and as soon as possible gave them fresh English potatoes, and they were soon in good health again.

There is another circumstance, which occurred during the years 1879 and 1880, and this year, namely, malarial fever was very prevalent, and several deaths were returned during the former years from that cause.

This year, however, no death has been returned from among the Europeans from this cause, but a few undoubted cases have been found among the Chinese, owing, I think, to the fact that they have not come under treatment early enough; but here we must not forget one thing, namely, that Europeans badly attacked with malarial fever generally leave the Territory.

During my residence up here, I have had one fatal case of pernicious anæmia in a European, æt. 46, who died in the hospital during August 1887. I should not have mentioned this case, had I not noticed that Sir Joseph Fayrer, in "Quain's Dictionary of Medicine," page 106, on Beri-Beri, writes: "Possibly, pernicious anæmia in Europe is the same disease." The notes of this case do not resemble in any way beri-beri; it simply ran the course that cases do in England.

From what I have so far seen of this disease, it well retains its character of being a very fatal one. I have had under treatment about forty cases, and twelve deaths have been recorded; but I have good reason to believe that about fifty more deaths have occurred. What percentage of deaths this really gives, I don't know, as I am unable to say whether they kept among themselves cases that eventually recovered; a few I feel certain were so kept, but how many I cannot learn; I rather think that probably the majority of the subacute cases came under my notice, owing to the fact that as the local hospital was unable to receive them, Dr. Stow, the Medical Officer in charge of the railway works, supplied them with food and medicines at their own homes, and this made them very ready to apply for assistance. It is with pleasure that I may here report, that no cases of Beri-Beri have so far occurred among the Europeans resident in the territory.

CAUSES.

According to authorities, I suppose I should commence with (1) Malarial climate; (2) Tropical temperature; (3) Propinquity to the sea; (4) Wet season; (5) Bad feeding.

(1) What the first cause may be, primarily, I cannot say. I suppose, malarial fever being very prevalent in China, a great many of the Chinese have probably suffered from it; but it is not necessary to be in a malarial climate to have Beri-Beri, as is proved by the fact,

that Chinese crews, sent to Newcastle-on-Tyne to bring out Chinese men-of-war, there developed an outbreak of this Beri-Beri among them. (A short account of this outbreak is, I believe, to be found in Braithwaite's "Retrospect of Medicine" for either last year or the preceding year.) Moreover, in *nearly* all the cases that were under my observation, there was no previous history of malarial fever.

(2) *Tropical Temperature.*—Though this disease has generally been known only in the tropics, the outbreak of it at Newcastle-on-Tyne shows that it is not absolutely confined within these limits.

(3) According to Dr. Maclean, this disease is most prevalent near the sea, generally within 50 or 60 miles. The cases that I have personally noticed have never been less than 75 miles, some 95; and, if I am right as regards the cases in 1879 and 1880, they chiefly occurred at 145 miles from the sea, and at an elevation of about 700 feet above low water level.

(4) *Wet Season.*—Undoubtedly the majority of my cases were developed towards the end of the wet season, but I have just seen a case, and a very severe and well-marked one, that has been recently developed, and no rain has fallen for the last five months.

(5) *Bad Feeding.*—In all cases that I have had under my care, the patients give the same answer to the question—What has been your diet? Answer—Rice and salt fish. In one case, that had nearly recovered, the answer was—Rice and salt eggs. In every case there was a marked want of fresh meat and vegetables.

That the majority of cases occurred during the latter part of the wet season was due, as far as I could make out, not to excessive exposure to the wet, but to the fact that the wet made the roads impassable, so that fresh supplies could not easily be brought; and this was important because, where these camps were, during that time, the country immediately around was not able to supply the number that required fresh food.

It was also a noticeable fact that all the patients (with three exceptions) had only been in the Territory from twelve to eighteen months, and all were young men under thirty years of age, many under twenty years, obviously those most likely to come off badly in bargaining for articles of diet, not knowing the absolute necessity for obtaining them.

In conclusion, as to cause of disease, I cannot help thinking that, for want of a better term, it is a scorbutic condition in a rice-eating race, probably influenced by a tendency to malaria:—

(1) High temperature is not required, as the outbreak at Newcastle-on-Tyne proved.

(2) All cases, as will be seen further on, had a large spleen, though certainly not what I call a malaria one.

(3) I think cases occurring 150 miles from the sea, can hardly be considered as due to coast influences.

(4) The wet season, I have shown, is not necessary to produce it.

(5) As I have shown, all cases that I have had personally to do with, have been fed badly. I have reason to understand, that the outbreak at Pine Creek was chiefly amongst new comers, who were badly paid, and ill-fed; and I have previously shown how disastrous

the rice diet was, apparently, with the aborigines of Australia in the gaol here, and how beneficial was the change to the European scale.

Though I have called it a scorbutic affection, I have to admit that I have never seen spongy gums, &c.; but there is one constant symptom, namely, pain in the muscles, and chiefly in those of the calves; but they do not become brawny and hard from the deposition of any inflammatory material.

Symptoms.

These occur in two forms, acute and sub-acute; but, as in all diseases, they frequently pass into each other; the acute, perhaps, easily becoming sub-acute; the sub-acute more frequently becoming acute.

Acute.—Patient feels ill, and complains of great heat in his epigastric region; he seems to rapidly lose the use of his legs, so that he cannot stand (but can move them more freely in bed), and he complains of intense pain in their muscles, which, on account of the want of tonicity, *appear* œdematous. He rapidly becomes very breathless, cardiac action being very quick, and there is always a soft bruit, which appears to be more hæmic than anything else. The legs then become œdematous, and, in fact, general anasarca rapidly commences, which appears to cause acute pain, especially in the lumbar region (lumbar cushion frequently well developed), and if the patient lives more than a few days, he has the appearance of having acute Bright's disease; but I have never seen the scrotum swollen. He becomes very restless, the face assumes a very anxious expression, the tongue becomes brownish-black, sordes collects about the teeth and lips. Respirations become quicker and shallower; cardiac action is so rapid, that the pulse cannot be counted. He assumes the sitting posture, keeps moaning, and dies suddenly, sometimes crying out, as if in intense pain, but he remains sensible almost to the last, and frequently will take liquid food up to the same period. In one acute case (fatal), marked jaundice existed. I have never found either albumen or blood in the urine; nor is there any great (if any) diminution in the quantity; sp. gr. generally about 1020. There is generally no great pyrexia; temperature frequently only about 99°. Some cases only last about 48 hours; one case only lasted 26 hours.

Post-mortem examinations show generally the blood to be in a very watery condition, and with a strong tendency not to coagulate, especially in very acute cases. The muscles are pale, and look sodden with a yellowish serous fluid; sometimes this colour is very marked. Lungs extremely œdematous, and generally a small quantity of fluid in the pleural sacs. Pericardium.—This sac I have seen distended with fluid, but in the majority this was not the case. Muscular tissue of the heart, pale and flabby. There were *always* ante-mortem clots, sometimes very large, extending into the blood-vessels which pass from this organ. The other blood was dark, and had generally a granular look, with a treacly consistency. In only one case did I find valvular mischief, and that was mitral. This appeared to be old standing, and was from the body of a *Tamil*, the only one of his race that suffered out of 150 working on the line. I attribute the fact of his suffering from this disease indirectly to his cardiac affection. As he was not competent to do his work, he became badly paid, hence badly fed. Chinese have a great antipathy to post-mortem examinations, especially

if the head is opened, so I had in many cases to respect this feeling; but in the cases in which the head was opened there was always a marked increase of cerebro-spinal fluid. Brain otherwise healthy; cord not examined. Abdomen.—Liver generally healthy and firm. Spleen considerably enlarged, soft, and of a kind of maroon colour. Kidneys large and œdematous, otherwise healthy looking, and capsule easy to remove. Supra-renal capsules, when found, healthy. There was also a collection of serous fluid in the peritoneal cavity, but not very excessive.

Sub-acute Symptoms.

Patient feels pain in the epigastric region, with a sensation of heat, rapid cardiac action, which evidently is the cause of great anxiety to him; muscular pain in the legs, which rapidly lose their power, so that in a few days the patients are quite incapable of standing. The extensor muscles seem first affected, then the abductor and adductors. This muscular pain is intense, so that they shrink when you put your hand near them; but the skin does not seem tender, and at first, there is no want of sensation. The legs seem œdematous, but only, as in the acute cases, from the want of tone in the muscles. The muscles of the arms may become affected, and assume the appearance of wristdrop, with very little power in the flexor tendons. In one case, the vocal cords became affected, and the voice rendered falsetto.

I have never seen complete paralysis in the extremities; all cases have been able to move them in a limited degree, and I think that the psoas and iliacus have never been paralysed, as I also think that the deltoids do not become so.

The legs become œdematous after about 10 days, and then the skin appears to become numb. I have never seen the upper extremities in that condition, unless the case is assuming the acute form. If the patient is going to get well, he may remain in this helpless condition for some time; and if he sits up, in the Chinese fashion, which is squatting, or rather squatting fashion, for he sits on his haunches, his legs pulled up towards his abdomen, the legs become intensely œdematous. They may then gradually improve; the arms move first, then the legs; the extensor muscles seem the first to recover. While so paralysed, there appears to be no electro-contractility, either to the continuous or interrupted currents.

When they are first able to stand, their attitude is very characteristic. They all appear to feel that the knee-joint will give way backwards, and appear to want support in their popliteal space. When commencing to walk, they use a stick, and grasping it with both hands, lean forward, drawing their legs after them, keeping the knee stiff. The improvement is slow, and generally three to four months elapse before they can walk well.

When these sub-acute cases are fatal, they die in the same way as the acute cases; in fact, they appear to develope acute symptoms, and they may do this some weeks after they appear to be doing well, but why, I cannot explain. I have sometimes thought that this, again, is due to want of food, not because the patient had not got it, but because, being sick for so long, unless he had plenty of cousins, &c., it was difficult to get people to cook for them, and I fear that, even when they were getting it cooked, they were paying for it, by giving away a part of their food. I have never been able to make a post-mortem investigation of one of

these cases. The muscles waste enormously in this class of cases; but I am unable to say how long it is before they are able to return to work, because they generally go back to China.

Prognosis.

This is, as far as I have seen, very unfavourable. I have never known a patient recover, when breathlessness set in, either early or after a few weeks' treatment. The patient then generally dies within fifty-six hours.

Treatment.

This being a disease of (for want of a better term) a scorbutic nature, fresh vegetables, especially English potatoes, and fresh meat are absolutely necessary.

As regards drugs, my colleagues, Drs. Berill and Stow, and myself have learnt to place great confidence in one, namely, digitalis. This drug, combined with iron, we have found very beneficial, and if this combination produces too much constipation, we combine it with ammonia and cinchona. The patients find the benefit of the digitalis, and frequently notice its absence if omitted by saying, "This medicine not all the same as the last; this one no good." How it acts I do not know, but I think its value is primarily due to its controlling power over the heart, and then, perhaps, to its action as a diuretic.

This paper is written with the full knowledge of my colleagues, and if digitalis is found to be of any service elsewhere, the credit is due to the observations of Dr. Berill, as he first gave it. I am further indebted to Dr. Berill for the great assistance he gave me in making the post-mortem examinations, as he frequently made them under very trying circumstances.

DISEASES OF POLYNESIANS, AS SEEN IN QUEENSLAND.

By F. Bowe, M.B., Maryborough, Queensland.

In this paper, I shall endeavour to draw your attention to a few points, in which diseases in Polynesians differ from the usual type.

In the first place, disease is not accompanied by the usual amount of pain and distress. For instance, one day I was surprised to see a boy with pneumonia of the right apex, with a temperature of 105°, sitting by the fire in a ward, smoking a pipe; and although this is an extreme instance, yet, in the early stage of pneumonia, few would remain in bed, unless ordered to do so; they would sit by the fire in cold weather, and on the verandah, or in the paddock, in warm. Yet, the type of the disease, taking the temperature as a guide, is quite as acute as in European races. In phthisis, too, the cough does not seem to distress them much, and they generally manage to get about until within three or four days of their death. In dysentery, you seldom see an expression of pain on their features, although this is a most painful complaint. This insensibility to pain must not be attributed to stoicism, as their

disposition is anything but that. They strongly object to the pain of a mustard plaster, and the sight of a lancet causes great dismay, and an incision is generally accompanied by a cry. These latter facts are not what you would naturally expect—incisions of the skin by means of a piece of glass form one of their native methods of treatment, and my patients often arrive at the hospital with a number of cuts, very like those made by a cupping instrument, over the forehead, breast, or side, wherever they have been experiencing pain; and when being tattooed with a couple of pins tied on to the end of a stick, and some blacking, they appear perfectly comfortable. I may mention, although this is not now-a-days considered a surgical operation, that they can shave very well indeed with a piece of broken glass.

As an instance of their great objection to any incision, I have seen a man with whitlow die from pyæmia. When I first saw him, he had an ordinary whitlow of a forefinger; he refused to have it incised, and went away. He came again a week afterwards, when the back of his hand had become very much swollen, but still refused either an incision, or to come into hospital. He was finally admitted, about ten days afterwards, in a sinking condition, and died in a couple of days. At the post-mortem, I found that the pus had burrowed nearly as high as the elbow, and there were pyæmic abscesses in the kidneys and lungs. They generally neglect their whitlows, and I have had to amputate a finger or a thumb on several occasions for it.

Another thing you notice, is the way in which these boys are able to retain their appetite for solid food. Patients with high temperatures, and when suffering from acute disease, will dispose of their ration of beef ($\frac{3}{4}$ lb., including bone, really $\frac{1}{2}$ lb.), and a pound of bread. Tuberculous patients retain their appetite a long time, and when it fails, they can still manage to eat potatoes, which they often appear to consider a luxury. One might argue that a liking for milk is an educated taste, from the fact that Polynesians, on their arrival in the colony, have all a very strong dislike to it; and when it has been essential that they should take it, as in dysentery, I have occasionally been obliged to give them a few doses of it by the nares. After that, they generally make up their minds to take it. Those who have been in the colony some time, do not appear to have any objection to it.

The only disease, from which they suffer more distress than white men, is influenza. In this they always complain a great deal of headache, for which they often cut themselves, as I mentioned above, and at the beginning of the attack it often affects the lungs very much. There is a great deal of dyspnœa, with rhonchus and râles, and a high temperature, 103° or 104° F., and when they are attacked at their work in the fields, I am told that they are often seen gasping for breath, and then they throw themselves down, saying that they are "close up dead" (that is, nearly dead). They generally recover speedily, and I have never seen a death from the complaint.

A very striking peculiarity is the occurrence of mania in connection with pneumonia. It most frequently comes on a few days after the commencement of the disease, and it might be regarded as replacing delirium, but against this view it is to be noted that it lasts generally three or four days after the temperature has subsided, and when you would expect any delirium to have disappeared. In a few instances I

have noticed that it has made its appearance after the acute stage of the pneumonia was over. The mania is sometimes accompanied by a good deal of violence, and occasionally the patient will clutch the iron bars which guard the windows of the strong-room, and shake them like a wild animal trying to escape. It does not appear to be more frequent with pneumonia of the apex than of the base, which is not what you would naturally expect. Both pneumonia and pleurisy frequently resolve very imperfectly, and are often followed by tuberculosis, particularly in the younger islanders.

Syphilis is seen almost exclusively as a local disease—a species of chancroid. I have only once seen secondary symptoms show themselves, and that was a case of syphilitic roseola. In none of my patients have ulcerated throat, or squamous syphilides, made their appearance; yet I firmly believe that this chancroid does affect the system, as the child of a diseased couple soon after its birth developed secondary symptoms, snuffles, and a rash about the buttocks. It improved for a time, but relapsed and died. Neither of its parents had had a sign of secondary symptoms, and their sores had healed up under local treatment, without any appearances that would suggest that they differed in any way from the sores of ordinary patients. The same was the case with the woman who had roseola; her sores differed in no respect from the ordinary characters. The sore differs from the English soft sore, if I may so call it, in not having the punched-out appearance or a clearly defined border; it begins as a pimple, with a couple of drops of pus at the top. Sometimes it is much larger and looks like a boil, but this is chiefly seen in a secondary sore, which forms on the dorsum of the penis. The skin breaks, the fluid escapes, and the sore begins to sprout, throwing out weak flabby granulations spreading at the margins. The situation of the first sore is generally either on the prepuce or about the frænum. In intractable cases, the original sore either does not heal at all, or heals very slowly; and a second one makes its appearance on the dorsum of the penis, throws out the same kind of granulations, and assumes the characters of the original sore.

The glands in the groin are next affected. These sometimes suppurate, without becoming sores, and after discharging for a time, they heal up. In another case, in a woman, they became caseous, and kept discharging through one or two sinuses, long after the original sores had healed. In this case, I cut down on the glands, removed them, and cut away all the unhealthy granulating tissue, and the woman made a good recovery. In other instances, the skin over the glands breaks, granulations spring up, and the patient has got two more chancres. These often spread, particularly downwards, in the direction of the perinæum. In the worst cases, fresh places begin, and keep increasing in size; the earlier sores, I said, began by appearing as papules, or pimples, the size of a small boil. In the later stages, swellings appear over the lower part of the abdomen, as large as a small orange, which ulcerate, and form large sores, giving rise to a disgusting discharge, and the condition of the patient is miserable in the extreme. One islander, who came into hospital in this advanced stage of the disease, asked if he might be allowed to hang himself, and I believe he would have been glad to have done so, if he had had the opportunity. In a woman, who had been rejected by the inspecting medical officer on board one of the labour

vessels, the disease had destroyed the perinæum and septum between the vagina and rectum.

In the treatment of these cases, I think that mercurials and iodide of potash do positive harm; they debilitate the patients, without exercising any influence for good over the sore. The only internal medicines that appear to do them good are tonics, iron and quinine, &c., and these only when the patient is weak. The local treatment, that I have found most efficacious, is cauterising the sore once a week with strong nitric acid, and if there are many granulations, using sulphate of copper as well, and then applying either iodoform or calomel, and zinc or tannin lotion. Sometimes one application does good, sometimes another. When the sore has been situated on the prepuce, I have several times performed circumcision, and with good results, the wound showing no tendency to become infected, and indeed, in one instance, where there was a considerable amount of ulceration, and in which it was necessary to remove the prepuce, on account of phimosis, the incision terminated in one of the chancres, and yet the wound healed, without becoming infected, and the greater part of it by first intention.

When commencing the treatment of a patient, I can never tell whether he will get well or not. Some of apparently the worst cases have got well. One boy had a large ulcerated sore in each groin; another boy had a large horseshoe-shaped sore, extending along the pubes, from one groin to the other; both of these got well in time. In other cases, where there has only been a small sore on the penis, the patient has steadily gone to the bad, the sore refusing to heal up, and fresh ones breaking out.

It is noteworthy that the scars, in Polynesians who have had syphilis, are very apt to break out again, when the health breaks down from any cause; for instance, from tuberculosis.

With regard to tertiary syphilis, I have seen a couple of cases of syphilitic ulceration, or what I took to be such. They had all the usual characters of the affection, but presented no scar, and denied ever having had a sore, but there may have been an inherited taint. They healed quickly under treatment; but I now regret that I did not try whether they would have done so under strictly local treatment, before combining it with constitutional remedies.

A fatty degeneration of the kidneys is present in nearly every instance in which I have made a post-mortem; in fact, it is quite exceptional to see a healthy kidney in a Polynesian, and this is frequently accompanied by fatty disease of liver, but the latter is not so general nor so extensive as that of the kidneys. I believe that fatty degeneration of the kidneys is not usually accompanied by the changes comprised under the term contracted kidney, but in Polynesians this is always the case, more or less; the size and weight of the kidney is diminished, varying from $3\frac{1}{4}$ ounces to less than 3 ounces (the ordinary weight of kidney being $4\frac{1}{2}$ ounces). The capsule is adherent in places, tearing the substance of the organ when detached; in other patches, it is comparatively free; the surface of the kidney is mottled with stellate veins, and is often partially divided into lobes by the contracted portions; it is seldom, or never, granular in appearance. On section, the cortical portion is generally diminished in thickness to some extent, whitish or yellowish in colour, and the pyramids healthy in appearance, but not always so. On microscopic

NECROSIS OF FINGERS AND TOES

(DR. BOWE'S PAPER.)

section, the epithelium is seen to contain fatty granules, and there is a distinct increase in the connective tissue between the tubules, the meshes of which contain a number of small round cells—in short, the appearances of fatty degeneration, plus interstitial nephritis.

The existence of this kidney disease, however, does not appear to give rise to any symptoms, or to interfere with the general health. There is no anasarca, frequency of micturition, nor albuminuria ; but I have often thought that its existence might be an explanation of the low-resisting power these Islanders possess against some diseases, dysentery and typhoid fever in particular. From the former they die very rapidly, if the attack is severe, and very often from extremely mild attacks, even when carefully dieted and treated ; and on post-mortem examination, the appearances of the bowel are quite insufficient to account for death. I may add that they seldom derive much benefit from ipecacuanha in large doses.

Until a few months ago, I never saw a case of typhoid in a Polynesian ; but in October, a few cases occurred amongst some new arrivals at a plantation. It was associated with dysentery, and ran a very rapid course, two of the boys dying after an illness of about 36 hours, and two who died on the plantation in even a shorter time (under 24 hours). I am informed that with new arrivals in the colony, it is generally fatal within a very short time, whilst those who have been in Queensland a year or two, very often recover.

I should now like to draw your attention to the photographs of a Polynesian named Lambar, who is suffering from a disease which is new to me, and about whose cause and nature I have no idea :—

919. Lambar, a native of Motlap, one of the Banks group, about 24 or 25 years of age. Was healthy up to nearly two years ago, when the ends of his fingers became swollen, the skin broke, and pieces of bone came out, and four months afterwards the same process commenced in his toes. He now has the appearance of having suffered from partial amputation of all his fingers and toes. The following is a description of his fingers in detail :—Left thumb is flexed at terminal joint, the last phalanx is shortened to half-size, and it is doubtful whether there is any bone ; it retains the nail. First finger.—The terminal phalanx has disappeared, and half of the next. There is still a small piece of thickened and roughened nail. On the under surface there is a superficial ulcer, due to pressure from using a broom one day. Second finger.—No nail on this finger, and still less of the second phalanx. Third finger.—Small piece of nail, no terminal phalanx ; the second apparently entire. Fourth finger.—No nail, the greater portion of the second phalanx gone. Right thumb.—Small piece of thickened nail, terminal phalanx gone. First finger.—A shred of nail, terminal phalanx gone. Second finger.—The nail retained, smaller than natural, and thickened ; both terminal and second phalanges gone. Third finger.—Nail is retained, terminal phalanx gone, the second shortened. Fourth finger.—Scale of nail, terminal phalanx gone, the second shortened.

The condition of the feet is much the same. The boy appears to be perfectly healthy in every other respect, no loss of sensation. The only peculiarity about him is the extreme tenderness of the skin. If he does any kind of manual work, however light it may be, a large blister at once rises, which soon afterwards forms a superficial ulcer.

MALARIAL FEVERS OF TROPICAL QUEENSLAND.

By T. S. Dyson, M.R.C.S., Normanton, Queensland.

Prevalence.

Malarial fevers are generally prevalent in Northern Queensland, and are not limited to one particular portion of it. We find them on the eastern coast and in the Gulf of Carpentaria, and in those districts where the dense scrubs with rich soil are found, and also in the low-lying marshy country; also wherever new or virgin soil is for the first time worked, such as on the Palmer goldfield, also the Croydon, and also where new railways are being formed. This is the case in those districts where malaria was scarcely or never known to prevail previously. On the Johnstone River in the early days of settlement, before the dense scrub was cut down, malarial fevers were very prevalent, and a considerable number of Europeans first employed died there, or were invalided in consequence; but as the ground became cleared, so the fevers also became of a milder type and less prevalent. The same also applies to Cairns, and to any other place where there is luxurious vegetation and stagnant water, with decaying vegetable matter in it.

Malarial fevers are the prevailing sickness in the Gulf of Carpentaria, especially at certain seasons. The proportion of fever cases treated in the Burke district hospital to all the rest has been for the past three years about one to four, but this year the proportion will be much greater, owing to the men working on the new line between Normanton and Croydon being treated at the hospital.

Season.

The regular malarial season commences after the wet season is over, viz. from May to September, or that of the south-east monsoon, but cases do occur all the year round. I find in the Gulf district, that the rainfall affects this season materially. Should the wet season be prolonged and the rainfall heavy, as in 1886–7, when we had about fifty inches of rain during the season, fever does not appear until late, viz. July; but should, on the contrary, the wet season be short, as in 1887–8, when we had only about eighteen inches during the whole wet season, then the fever season begins early, as it did this year, in April. The reason why the autumn and winter months are pre-eminently those of malarial fever is accounted for thus: After the rainy season is over, the lagoons and low-lying lands become dry from the heat of the sun, and consequent evaporation; and the prevailing S.E. winds, blowing over this low-lying country, bring malaria in their course.

Locality.

Malarial fevers appear to confine themselves to the low-lying grounds, dense scrubs where the soil is rich and luxuriant, or to those parts where the earth is freshly disturbed. Fever is not heard of on the table-lands or at any considerable elevation, except in imported cases.

Types.

(A) *Intermittent* (quotidian, tertian, and quartan); (B) *Remittent*; (C) *Typho-malarial.*

The intermittent varieties of quotidian, and especially tertian, are the most prevalent in the Gulf district. Remittent is rare, as I have only seen two cases of it during my four years' residence. The typho-malarial, observed by Dr. White at Geraldton, is decidedly a malignant form of malarial fever, and is decidedly fatal. The system of the patient appears charged with the malarial poison, and in several cases the illness appeared to come on suddenly, and in others there was a history of neglected intermittent or remittent fever for some time previously. In most cases it has a tendency to run rapidly to a fatal termination, unless checked by proper remedies. Dr. White also says that in the early days of settlement on the Johnstone River, when malarial fever may be said to have been at its worst, *bad* cases became as "*yellow as a guinea*," and that he has had three such cases (one European and two Kanakas) which resulted fatally. In each of these, jaundice supervened before death, but it is not the rule, as he did not observe it in others of his cases, whether fatal or not.

Severity.

The cases I have seen of intermittent fever are usually of a mild type, especially if they are treated early and occur in an otherwise healthy subject. One of the first cases admitted into the Burke District Hospital was also one of the severest attacks I have seen, as the patient was insensible and delirious for a week after admission; but this was quite accounted for, as it was ascertained that he had been drinking heavily for some days before. The most severe cases, and usually the most prolonged, occur in those who have been living on poor diet for a considerable time, and who have had no treatment. Of remittent fever I have only seen two cases, and these were both fatal; one of them had been subject to attacks of malarial fever whilst resident in the Southern States of America. The typho-malarial, as mentioned above, is a decidedly fatal form of fever.

Duration.

The duration of intermittent fever, when treated, is usually short in first attacks and in healthy subjects, but in anæmic subjects usually two or three weeks. But, as a rule, it is very liable to recur sooner or later, if the person continues to live in the district where he contracted it, and generally at the same season the following year, if not sooner. The duration of remittent is from five to twenty days, or longer, and the convalescence from it is often very prolonged, if the patient remains in the same district where contracted. The duration of typho-malarial is from two to three weeks, but death may occur as early as the second day; when convalescence is established, it is usually rapid and complete. When recovery does take place from an attack of typho-malarial fever, it appears to render the patient proof against malarial influences for some time to come.

Amenability to Drugs.

All these fevers, with the exception of the remittent type, are very amenable to quinine, arsenic, eucalyptus, salicylic acid, or salicylate of soda. Eucalyptus I used frequently at first, but found it so nauseous,

that I have not used it lately. Quinine, in a mixture or in a pill, I most usually rely upon, and find it most efficacious; hypodermically, I have not used it, as I have not been able to get a soluble form of it, but I hear of its being most satisfactory, so I may employ it later. Quinine and salicylate of soda, together, prove also efficacious. I frequently use at the commencement of an attack either an emetic, or a purgative of calomel and compound jalap powder to unload the liver, and I find it also satisfactory. In the convalescent stage, I usually give some preparation of iron. I intend also trying the picrate of ammonium as recommended by Dr. H. M. Clark, of Amritsar, India, in the *Lancet* of February 19, 1887, but the drug has been difficult to procure in the Colonies.

Sequelæ.

The spleen and liver are almost always enlarged to some extent during an attack, but become normal later on. Repeated attacks leave the spleen chronically enlarged, but to nothing like the size seen either in India or in the Eastern Counties in England. Dr. White had recently under his care some ill-fed children, who had had repeated attacks of intermittent fever without any treatment, whose spleens were in each case the real "*ague-cake*," and in each case, when first seen, the spleen extended almost to the pubes. Malarial cachexia is frequently met with as a sequela to both intermittent and remittent fevers; it sometimes, however, comes on without fever developing itself. Removal of the person from the district effects, generally, a speedy cure.

In conclusion, I find that prolonged residence in a malarious district does not render one insusceptible to attacks of fever, for I had a patient recently who had been resident thirteen years in the Gulf, and was at that time suffering from a first attack of malarial fever. I have also several cases of residents of some years' standing suffering from a first attack. The residents in the town are not so liable to attacks as those living outside in the bush, or travellers. And this is accounted for because of their better and more varied diet, and the superior quality of their drinking water. The bushman and the traveller have frequently to drink whatever water they can get, and this is frequently stagnant, and from lagoons filled with decaying and dead animal and vegetable matter. Likewise, they sleep chiefly on the ground, and invariably in the proximity of some water-hole, and exposed to the full force of the malaria-carrying winds.

Dr. White, of Geraldton, who resided and practised in a malarious district in India previous to coming to Queensland, states that the fevers found in India are *undoubtedly the same* as those met with here in tropical Queensland.

THE HEPATIC ELEMENT IN DISEASE.

By J. W. Springthorpe, M.A., M.D. Melb., M.R.C.P. Lond.

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The foregoing title is epigrammatic, rather than logically accurate. It is the nitrogen-compounding, and bile-producing functions which are under review, and not the glycogen-forming or poison-separating, otherwise than as they suffer sympathetically. Structural diseases and degenerations are similarly outside present discussion. Thus restricted, however, in scope, the hepatic element merits profound study. The present paper raises the questions of the wide range of its operations, some of the more important of its ill-understood associations, and its predominance amongst the factors of disease throughout the colony.

(1) Its wide range of operation.

The *local hepatic action* concerned is (*a*) the dehydration of peptones into insoluble albumen, to be gradually served out to the blood stream in compounds of complex formulæ and feeble chemical affinities ; and (*b*) the separation of the bile for circulation in the portal system for purposes of fat digestion, fæcal disinfection, and extrusion. The *general hepatic action* concerned is the resultant throughout the system of the circulation of these explosive nitrogenous compounds. As only a small portion enters into cell repair as fixed-albumen, or proceeds to form fat, the function of the larger portion must be sought elsewhere. The view is here taken, that in certain, at present ill-understood, but still, in all probability, perfectly definite amounts and combinations, these compounds are so essentially bound up with the local production of force of all kinds, that they may be called the *physiological stimuli* necessary for the functional activity of the tissue and organ. When they are present in normal proportions, the course of organic life will run smoothly, and the appropriate effects will follow other stimuli, peripheral and central.

The key to the interpretation of the part played by the hepatic element in disease, lies in the recognition of a corollary from this law, viz., that in disease, not only is the local action ill-performed, but this state of physiological stimulation passes into a stage of *pathological irritation*, by which functional disturbances may be produced in all parts, but especially in the part vulnerable in the individual case. Observation verifies the truth of this conclusion ; yet, neither the text-books nor the practitioner are found, as a rule, attaching thereto its vast clinical value. Hence, treatment is often found to be symptomatic, from the non-recognition of the basis, upon which depends this system—wide series of functional disturbances. The following table, therefore, may be of use, since it contains a more complete list of the symptomatology

than has been found elsewhere, and since it is based upon clinical experience, and not upon *a priori* probabilities :—

Site of Disturbance.	Symptoms Produced.	Remarks.
In the liver itself.	(*a*) Periodic hepatic stasis and congestion.	Hence the feeling of weight and scapular pain.
	(*b*) Periodic portal stasis.	Hence the tendency to piles, varicocele, ovarian and uterine congestion, dysmenorrhœa, menorrhagia, &c.
	(*c*) Irregular bile separation.	Hence the irregular bowels, variable stools, flatus, colic, coated tongue, mal-assimilation of fat, the nasty taste in the mouth, and the jaundice of varied extent.
In the tissues.	Pigmentary deposits, dating even from fœtal life, and continuous after birth.	Hence the dark skin, hair, and complexion, which almost invariably characterise the hepatic ; hence, also, the black specks, &c. before the eyes.
	Tendency to local inflammations, and interrupted healing of injured parts.	
In circulatory system.	High tension of arteries, accentuated second sound, slow pulse, possible cardiac hypertrophy.	The first three almost invariably present.
	Arterio-capillary fibrosis, endo-arteritis, rupture of vessels, even endocarditis.	Generally more marked when combined with renal defects.
In respiratory system.	Wheezing, asthmatic attacks. Bronchial spasm present in ordinary catarrhal conditions.	Rarely absent, if sought for.
In muscular system.	Muscular cramps, "muscular rheumatism," bronchial spasm, cardiac hypertrophy.	The former very characteristic.
In mucous membranes.	"Rheumatic sore-throat" and catarrhs.	
In serous membranes; in synovial membranes.	Tendency to inflammation, pleurisy, synovitis, pericarditis, periostitis.	Herein we have the possibilities of the joint affections, &c., of acute rheumatism.
In nervous system.	Explosibility and want of control, headaches, vertigo, restlessness, migraine, disturbed sleep, irritable temper, fidgets, hallucinations, fits of passion, strange modes of thought, semi-insane acts, various neuralgiæ, even epilepsy and mania in the markedly neurotic, climacteric neuroses, well marked.	The endurance and determination characteristic of the class may be ascribed to the *continued* brain stimulation. The combination of the *hepatic* and *nervous* seems a colonial feature.

Site of Disturbance.	Symptoms Produced.	Remarks.
In skin.	Outbreaks of papular character — furunculi, lichen, urticaria, and also psoriasis.	Eczema seems to occur rather in the cases of *renal* inadequacy.
In kidney.	Azoturia, with renal, vesical, and urethral irritation, grit, gravel, calculi; finally granular kidney, where defective elimination is added to mal-assimilation.	Also an extremely common combination.

In the foregoing, no attempt has been made to separate the remote effects of biliary disturbances from those of disturbance of the nitrogen compounding function, because the two are so intimately related that differentiation is practically impossible. Probably, however, pigmentary discolorations connote graver disturbance of the bile function,whilst the remote effects of the latter upon the brain, as seen in hypochondriasis and jaundice, point to depression rather than to irritation, as is the case with the former. Again, in those whose vulnerability is thus hepatic, obesity may follow from greater efficiency of the glycogenic function, or diabetes supervene upon its disturbance.

Lastly, the temperament is generally inherited, and marked by the above remote symptoms, in addition to the generally recognised visual characteristics. But the symptoms may be produced even in these without any such predisposition, by continued excess in meat, malt liquors, or heavy wines.

(2) Some of the more important of the less recognised associations of the Hepatic Element.

(A) Rheumatism in all its varieties, is here placed by the writer :—

(*a*) *Muscular rheumatism* may be at once dismissed as admittedly hepatic in origin.

(*b*) Charcot and others have remarked how frequently *chronic articular rheumatism* in all its forms, is associated with migraine, asthmatic attacks, muscular pains, skin eruptions, and other forms of hepatic disturbance. The present paper adduces no further evidence in support of this connection. Charcot, however, and others have clearly shown that all varieties are causally connected with the acute articular form—hence, this theory of the hepatic origin of rheumatism stands or falls according as the hepatic element can be proven or not to be causally connected with the acute variety.

(*c*) The evidence advanced in favour of this connection between the hepatic element and *acute rheumatism*, is as follows :—

(1) The connection already mentioned between chronic rheumatism and the hepatic temperament.

(2) The recognised origination of an attack in hepatic derangement. Thus, in "Quain's Dictionary," Dr. Mitchell Bruce remarks how "an attack of acute rheumatism is occasionally referred to derangements of digestion, and of the functions of the liver, especially in subjects who

have previously suffered." Closer observation will show this to be the rule rather than the exception, exposure to wet and cold often preceding this derangement, and causing it.

(3) The fact that "indulgence in abundant, rich, or indigestible food will certainly determine a relapse in persons convalescing from the disease."—(Mitchell Bruce, *loc. cit.*)

(4) The fact that the preventative treatment generally advocated is essentially that of hepatic vulnerability and the hepatic temperament, viz., diet simple, and largely vegetarian, free action of skin, bowels and kidney, prevention of hepatic congestion by flannel underclothing, avoidance of malt liquors and sweet wines, and preparation for damp and sudden atmospheric changes.

(5) Direct observation as to the class of cases in whom acute rheumatism has occurred. During the past 12 months, 62 cases have come under the writer's observation in the wards of the hospital and outside, either suffering from an existent attack of acute rheumatism, or with a history of a previous attack. In 12, unfortunately, no note was made as to temperament, but out of the remaining 50, no less than 44 are noted as having been markedly hepatic; whilst in 3 of sanguine temperament, there was a history of beer-drinking, and of the other 3 cases—of gonorrhœal rheumatism—one, at least, was unmistakably hepatic.

This shows, in the writer's opinion, that there is an hepatic element in the causation of acute rheumatism, and from the analogy of other effects of the same cause, there seems nothing in the pathology or symptoms of the disease to upset the hypothesis that the local irritant at work is hepatic in origin. What may be the nature of the nitrogenous compound, remains unsettled. That the joints are affected may depend, as Jonathan Hutchinson remarks, upon an arthritic vulnerability, just as occurs in other parts in the same disease. The co-existence of endocarditis is readily explained, but the characteristic sweating and rise in temperature remain problems which are difficult of satisfactory solution upon this, as upon all other hypotheses.

(*d*) As to *gout* and *rheumatic gout*, it is held by the writer, that gout is a matter between the liver and the kidney, but more a disease of defective elimination than of mal-assimilation. The theory of the hepatic origin of rheumatism affords an explanation of *rheumatic gout* as a distinct disease, in which both hepatic derangement and renal incompetence are present, but the former dominating the latter.

Thus, the general conclusion arrived at is, that all the varieties of disease styled "rheumatism" and "rheumatic," are members of the one family, and that, as a rule, which has been found invariable, the rheumatic are also hepatic.

(B) The effects of the hepatic element in the *nervous system* are deeper and wider than is usually recognised, and merit a higher place in clinical medicine than is usually given them. This is especially the case in this colony, wherein it is claimed the main tendency is towards the bilio-nervous temperament. Thus, in epilepsy, out of 61 consecutive cases, the writer found no less than 19 markedly hepatic, and hepatic treatment proved effectual, even after the skilful and continued use of specific sedatives had proved a failure. In colonial diabetes also, the hepatic element almost always exists, in conjunction with the neurotic. The same element is the basis of the varied and numerous ailments

which are enumerated in the foregoing table, under the heading of *Nervous Symptoms.* It is found giving a special character to the manifestations of influenza, and it is claimed as a prominent factor in the production of our exceptional lunacy statistics.

(3) The Predominance of this Element in the Production of Colonial Disease.

In the opinion of the writer, the hepatic element occupies, in the production of Victorian disease, a position second to no other cause, excepting, perhaps, insanitary arrangements and surroundings. Any gathering of the general public will suffice to show the numerical preponderance of the hepatic over all other temperaments, and the records of hospital and private case books will be found to demonstrate the same result, even in cases where the general derangement has led the individual to seek for relief from his troubles. The writer believes that the wide operation of the same cause may be further seen in the extent to which rheumatism, renal, and neurotic diseases prevail.

The cause of this predominance of the hepatic factor amongst us seems threefold :—

(*a*) The extreme variability of our climate.

(*b*) The amount and nature of our alcoholic stimulants.

(*c*) Our excessive use of meat as an article of diet.

Each of these points is fully discussed in a paper before this Congress, on the "Hygienic Conditions Existent in Victoria." Further notice here is, therefore, unnecessary.

NOTES OF SEVEN CASES OF TYPHLITIS.

By A. S. Joske, M.B., Ch. B.

Late Resident Medical Officer, Alfred Hospital, Melbourne.

The following brief notes are of cases of typhlitis that have occurred in the Alfred Hospital in 1886, 1887, and 1888, and of one case I have seen in my own practice.

The occurrence of so many after typhoid fever has led me to believe that a number of so-called relapses are, in reality, due to the formation of abscesses in the neighbourhood of the ileo-cæcal valve. If my surmise be correct, it helps to show that such a sequela is not altogether unfavourable.

(1) M. C., æt. 31, female, was admitted into the Alfred Hospital in September 1887. Twelve days previous to admission, while lifting, felt a sudden pain in the right iliac region, which became persistent. On admission, had some dulness on percussion in the right iliac region, with drawing up of right thigh. Her temperature was 103°. Had local applications applied to seat of dulness. Had rigors on September 23. The swelling was aspirated on the 27th September, and pus drawn off. This aspirating was done three times. Tongue became red and raw. Temperature continued persistent. Bogginess then felt posteriorly.

Free incision was made in right lumbar region, and a quantity of pus evacuated, and a tube was inserted. Temperature fell rapidly. The pus soon stopped, and the patient was discharged, cured, on 11th November.

(2) W. M., æt. 28, male, was admitted into the Alfred Hospital in April 1887. Had mild typhoid fever, the temperature falling to normal on the twenty-fifth day. He had pain in the right iliac region, with rigors. Dulness in the right iliac region, on percussion. Temperature ran up to 104·4° gradually, with exacerbations and remissions. On the thirty-seventh day, passed about four ounces of pus. Pain disappeared, and dulness diminished. Was quite well on the fifty-second day.

(3) A. F., æt. 29, male, was admitted into the Alfred Hospital in April 1887. Had mild typhoid fever; temperature fell to normal on the sixteenth day; then had pain in the right lumbar and iliac region. A swelling gradually formed. Had rigors. Temperature rose to 104·6°. On twenty-fifth day, passed a quantity of pus. The temperature fell to normal on the thirtieth day, after passing a little more pus twice.

(4) A. H., æt. 23, male, was admitted into the Alfred Hospital in March 1887. Had bad typhoid fever, with pneumonia and hæmorrhage. Had rigors on the forty-second day. Had no particular dulness in the right iliac region, but pain between that and the umbilicus. Passed pus on several occasions up to the fifty-seventh day. Temperature fell to normal on the seventy-seventh day.

(5) C. M., æt. 29, male, was admitted into the Alfred Hospital in September 1887. Had bad typhoid, with some hæmorrhage. Like Case 4, had no particular dulness, but pain between the umbilical and right iliac region. His temperature became normal on the thirty-eighth day; then he had shiverings, and passed pus on four occasions. This patient, in addition to the pain, complained of peculiar rumblings in the umbilical region until the pus came away.

(6) A. C., æt. 26, male, was admitted into the Alfred Hospital in December 1886. He had a mild typhoid fever, the temperature becoming normal on the 28th day. Then a hardening and thickening, with dulness and pain on percussion, could be felt in the ileo-cæcal region. The temperature rose until the thirty-fourth day of illness, when he passed two ounces of pus, when the temperature fell to normal, and the swelling gradually disappeared.

(7) E. S., æt. 15, female, had a mild form of typhoid fever in April 1888. Twenty-six days after first being laid up, had pain in the right iliac region, with some dulness and pain on percussion. Had rigors, with rise of temperature. She passed pus six days afterwards; then the temperature fell, and the swelling disappeared.

She again had an attack in August 1888, with pain in the right iliac region and dulness, but recovered on passing pus on the eighth day of illness. She had two other attacks, in September and October, but since then has enjoyed excellent health.

THE IMPORTANCE OF THE CONSTITUTIONAL FACTOR IN RELATION TO DISEASE.

By James Robertson, M.A., M.D.

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Amidst the daily routine of professional life, and the cares and anxieties incident to the active practice of our profession, it is difficult to find time for study. Too frequently, after the duties of the day are ended, the body is exhausted by fatigue, and the mind is unequal to overcome the *vim inertiæ* with which it is oppressed. Another difficulty, and no small one, that met me at the inception of my design to contribute a paper to this Intercolonial Congress, was the choice of a subject. This was surmounted by our very active and energetic Secretary allotting one to me. Under the circumstances, I hope my subject and its treatment may meet with the favour of a sympathetic audience.

The subject thus assigned to me, "The Importance of the Constitutional Factor in Relation to Disease," is very comprehensive, and admits of voluminous treatment; but it will be my aim to make my remarks brief and practical, as far as possible.

It will be readily allowed, that a careful examination of the general symptoms and physical signs is all-important in determining the nature and locality of a disease; but to enable us to complete the diagnosis, and to indicate the prognosis and treatment, it is not less important to ascertain the "constitutional factor." It may be truly said, that the "constitutional factor" is the key-note to treatment. It is therefore necessary, in every case, to note particularly the appearance and physique of the patient, to obtain a knowledge of his previous state of health and tendency to disease, and, as far as possible, of his family history. "Like produces like," is the general law of life. It is manifested alike in the vegetable and animal kingdoms. The embryo plant unfolds its leaves, and expands its branches, after the manner of the parent tree. The child grows up in general likeness and bodily conformation, the type of one or other parent. Even vices of formation, physical deformities, are not infrequently inherited. The child also inherits the temperaments of the parents, often so blended, that it is difficult to decide which temperament predominates most, that of the father, or that of the mother. The characteristics manifested by the physiognomic appearance and general conformation, the development and activity of the various organs, enable us to recognise the temperament best marked or typified. Although each temperament is said to predispose to certain diseases, yet the most robust health may be enjoyed by individuals of the sanguine, or of the bilious temperament, and even by those of the lymphatic, or of the nervous temperament, when their subjects are placed under conditions favourable to health.

Children inherit not only the temperament, but the *diathesis*, of their parents—that morbid tendency or predisposition to disease, liable to be transmitted from parents to children. When both parents manifest the

same *diathesis*, it may become strongly expressed in the children, by external bodily features and conformation, as in the strumous *diathesis*. Again, a *diathesis* may be feebly or faintly marked, yet it is innate, born with the individual, and liable to become developed under the influence of exciting causes.

It cannot be said that diseases are, as a rule, actually inherited. Only such peculiarities of constitution as predispose to them, and that favour their development, are so. Children are not born with tuberculosis, rheumatism, or gout, but with such latent conditions of constitution, as lead to their development in after years, when influenced by the operation of agents acting from without—exopathic; or, it may be, generated within—endopathic. The morbid hereditary tendency may be so strong, that disease may become developed under circumstances favourable to health, and even when care is taken to prevent it. Tuberculosis may be adduced as an instance in point. Again, when the predisposition exists, the disease may remain latent until a certain age, and then become actively developed, as occurs in phthisis, gout, cancer, &c.

Morbid tendencies are liable to be brought into activity at different epochs. Syphilis and scrofula are manifested in early life; phthisis and rheumatism, at or about the age of puberty and adult age; gout, beyond the middle period of life; asthma and cancer, in advanced years. Some diseases are not marked by any external features, or other indications in early life, but are none the less to be considered hereditary. I may particularly instance diseases of nervous origin—chorea, mania, epilepsy, apoplexy, paralysis, neuralgia; also diabetes, cancer, and some skin diseases.

All the children of the same parents do not partake alike of their morbid tendencies. When the parents exhibit different *diatheses*, some of the children may inherit and manifest that of the father, and some that of the mother, in a more pronounced form. It is generally allowed that the morbid tendency of the mother is more liable to be transmitted than that of the father.

Another peculiarity of constitutional disease is the law of atavism. The hereditary tendency may fail to be expressed in the children of parents known to be the subjects of disease, and become developed in the grandchildren. The tendency lies dormant, as it were, in one generation, and becomes expressed in the next.

I have said that children are born with a tendency or proclivity to disease, but in some cases they are born the subjects of actually existing disease. The cachexia is transmitted, the disease is congenital—born with the individual. This fact is well illustrated in congenital syphilis.

Cases are reported of small-pox and measles, and also of intermittent fever, being congenital, due to the specific poisons of those diseases operating through the systems of the mothers.

In constitutional syphilis, a peculiarity is sometimes observable in the transmission of the disease. One child may be born apparently perfectly healthy, and free from the syphilitic taint, while the next presents undoubted signs of the disease. The syphilitic taint is manifested in a variety of ways, both externally and internally. The

external appearances are readily recognisable in affections of the nasal bones, and of the skin and mucous membranes, and, at a later stage, by the appearance of the teeth. The morbid changes induced in internal organs are often very insidious and very serious, affecting, as they do, the brain, liver, lungs, &c., while the diagnosis is very obscure, and can only be determined by a process of exclusion, and a knowledge of the "constitutional factor." This knowledge is still more important in enabling us to form a prognosis and indicate the treatment, inasmuch as the treatment, to be successful, must be directed to the specific constitutional disease.

To illustrate the importance of recognising the "constitutional factor," I shall refer a little more in detail to the scrofulous or tubercular *cachexia*. I presume it will be allowed that scrofulosis and tuberculosis may now be regarded as commensurate or convertible terms, seeing that the bacillus tuberculosis finds a habitat alike in scrofulous glands and tubercular lungs, and is said to be the cause of both conditions. Scrofula may be regarded as the manifestation of tuberculosis in childhood, and phthisis in adult age. In childhood, the bacillus tuberculosis appears to have some special affinity for the lymphatic glands of the neck, the mesenteric and bronchial glands, and for serous and mucous membranes, bones, and joints; while in adult life it selects the lungs, and other internal organs, as points of attack, as being, it is assumed, *partes minoris resistentiæ.* The reason why, is problematical. We know, however, that healthy vigorous children, with abundance of nutritious food, living under favourable hygienic conditions, are able to resist tuberculosis; and that the weakly, badly fed, and neglected, are liable to fall victims to it. This is especially the case when the hereditary predisposition is strongly expressed, for then the onset of the disease occurs at an early age, and its progress is more rapid. In this Colony, the conditions favourable to the development of tuberculosis do not prevail extensively; and consequently, we find that tabes mesenterica, tubercular peritonitis, and meningitis, are comparatively rare, the mortality from those diseases not amounting to one-half that incident to England and Wales.

Children who have inherited the tubercular diathesis may, under healthy conditions, pass safely through the trials of childhood, and reach the age of puberty. Tuberculosis of the lungs is then liable to supervene, under the influence of some exciting cause—it may be, exposure to cold.

Catarrhal bronchitis, or other inflammatory affections of the lungs, such as sub-acute pneumonia or pleurisy, not infrequently merge in *phthisis pulmonum.* The occurrence of any of the exanthemata, or acute specific fevers, may so debilitate the system as to render it prone to tubercular disease. Of course, the advent of phthisis under such circumstances presupposes exposure to the influence of the bacillus tuberculosis, and its introduction into the system. When, however, care has been taken to promote recovery from debilitating diseases, to restore the strength by suitable nourishment, to correct errors of digestion, and thus promote healthy nutrition, immunity may be obtained from the invasion of bacilli.

The important factor, therefore, in incipient phthisis, is the constitutional: for, without doubt, bacilli are often inhaled by many who come into

contact with phthisical subjects, and yet the disease is not communicated. We have also abundant evidence to prove that tuberculosis is often arrested in childhood, youth, and adult age. This is shown by the subsidence of well-marked symptoms, and physical signs, by restoration to health, by improved nutrition, and increased weight. Further evidence of the curability of the disease is furnished by the presence of calcareous or chalky bodies in glands, lungs, and other internal organs, and by the cicatrices and small cavities in the apices of the lungs, so frequently found after death. In such cases, we are constrained to believe that bacilli die, or become inert, or that their inroads have been arrested by healthy living tissues, and they have been cast off.

The importance of studying "the constitutional factor," in indicating the treatment of disease, cannot, perhaps, be more strongly enforced, than by passing in review the treatment suggested by the bacillary theory of tuberculosis, and that directed to support and strengthen the system, by such means as promote healthy nutrition. The latter I cannot but regard as the more rational, and, so far as yet demonstrated, the most successful mode of practice.

The dominant idea, influencing the treatment of tuberculosis at the present day, is the discovery of some agent calculated to destroy the life of the bacilli, without injury to the system, and certainly the measures adopted in accordance with this view cannot as yet be pronounced a success. Numerous antiseptic and anti-parasitic remedies have been introduced into practice. Their effects have been tested by their action on bacilli and other micro-organisms, external to the body, in order to determine the quantity, or strength, of the various parasiticides necessary to arrest their development; but their action on bacilli, in the tissues of the living body, cannot be thus estimated, for very obvious reasons. The mode of administration generally adopted has been by inhalation, subcutaneous injection, intra-pulmonary injection, and injection *per rectum.*

A mere enumeration of medicaments employed, will show the bias given to therapeutical research by the adoption of a theory. Mercury perchloride and bin-iodide, iodine and its compounds, iodoform, carbolic acid, creosote, terebene, turpentine, eucalyptol, aniline, carbon-bisulphide, *et hoc genus omne*, have been employed. Ingenious instruments have been devised for inhalation, and for injection of gases *per rectum*, but their use has not been attended with any positive or permanent good result. Bacilli are found to survive all efforts to destroy them, and the means used are not always innocuous to the patients.

The most successful treatment yet discovered for the prevention and cure of tuberculosis, is that directed to promote the general health. When the tendency or proclivity to the disease is inherited, our hope and strength rest in adopting measures of prevention. These consist in removing a patient from all unhealthy surroundings, from all debilitating causes, and in enforcing the observance of general hygienic measures—early hours, bathing, cold or tepid sponging, and friction, regular habits, exercise in the open air, change of air and scene. Special attention should be given to the state of the digestive organs, as often a peculiar form of dyspepsia precedes the morbid changes. Errors of digestion should be corrected by the use of such medicines as are indicated, and of

wholesome, nutritious, and easily-digested food. So long as the nutritive processes are active and healthy, there is little occasion to dread the inroads of bacilli. The means that prove most efficacious in the treatment of tubercular disease, are just those that give tone to the system, and promote healthy nutrition.

The advantage of residence at a high altitude is, in a measure, due to the diminished pressure and purity of the atmosphere, but still more to the bracing effect of the cold, which invigorates the system, stimulating the various functions, and especially the appetite, digestion, and assimilation. Alpine air is not to be regarded as a specific, but rather as a tonic plan of treatment, most beneficial in the early stages of the disease, when lesions are not extensive, and in chronic cases uncomplicated with disease of the kidneys or circulatory system. A mild, warm climate has been recommended, and without doubt has served to prolong life in cases of advanced disease. Its effect, however, is not conducive to recovery, as it induces languor, lassitude, and prostration of strength. By its enervating influence, it unfits for exercise, tends to destroy the appetite, and impair digestion, and thus leads to mal-nutrition, and progressive emaciation. Sea voyages are beneficial, provided the cuisine is good, and table liberal, the constant renewal of pure air favouring or inducing healthy functional activity.

In the Australian Colonies, a climate suitable for consumptive patients may be found at all seasons of the year, but only by migrating from south to north, and again from north to south, according to the season. In calculating the benefit to be derived from change of climate, not only is the stage and extent of the disease to be considered, but the means of the patient to procure suitable residence, food, and even luxuries and amusements. If he has to earn his living by engaging in some in-door employment, if he has to sacrifice his comfort to "the necessity of living," change of climate will avail but little.

I shall now briefly direct attention to another constitutional disease met with in middle age or advanced years—gout, or lithiasis, a term applied to it from the condition on which it depends. It is to gout occurring in its chronic and irregular forms that my remarks are particularly directed. The gouty *diathesis* is often inherited, but the *cachexia* may be acquired, may become developed, even in those of temperate habits as regards drink, when animal food is consumed in excess of the wants of the system, and indolent habits are indulged, or insufficient exercise is taken. The disease has always been attributed to indulgence in the pleasures of the table, to wine and good living, but it may arise at a certain age in those predisposed by heredity, induced by some temporarily exciting cause. It is liable to assume many forms or phases, to imitate or complicate many diseases. It is veritably a protean malady. Although its most characteric manifestations are observed in nodosities of the smaller joints, and effusions into the synovial membranes of the larger joints, it is liable to implicate every organ and tissue of the body. It affects the nervous, circulatory, respiratory, alimentary, and emunctory organs. It is to be recognised in cerebral affections, in severe headaches, vertigo, partial paresis, temporary troubles of special senses, affections of the eye and ear, neuralgia of different nerves, more especially of the sciatic. Its effects on the heart are indicated by palpitation, and irregularity of its action,

by flying pains, and a feeling of oppression in the cardiac region ; and on the blood-vessels, by atheroma of the arteries ; on the respiratory organs, by inducing or modifying chronic bronchitis and asthma ; on the stomach and liver, by dyspeptic troubles—pain, acidity, flatulency, and deranged bowels ; and on the kidneys and urinary tract, by degenerative changes of the kidneys, and urinary irritation from elimination of lithates.

It is not infrequently remarked, when a patient is suffering from various anomalous symptoms suggestive of what may be termed latent gout, that a regular fit of gout would prove curative, as, usually, improved health follows. It is like the bursting of a thunder-storm, which purifies the atmosphere. Although gout and rheumatism are characterised by very different and well-defined symptoms in the acute form, there is a very close relationship between them when occurring in the chronic form. Both are due to morbid poisons generated in the system and circulating in the blood, which affect different tissues and organs, lithic acid being accepted as the morbid factor in the one, and lactic acid in the other. Both are manifested by derangement of the functions of assimilation, and of secretion and excretion, and both yield to the same line of treatment—alkaline, alterative, and eliminatory.

The importance of studying "the constitutional factor" is well exemplified in all diseases associated with the gouty *diathesis*. In inflammatory affections occurring after middle age, the possibility of their being so associated, and thereby modified, demands inquiry. Not infrequently it is found that diseases affecting the synovial and mucous membranes are intractable to treatment; that effusions into joints, tonsillitis, laryngitis, bronchitis, asthma, and cystitis, do not readily respond to treatment, unless it be directed to counteract the prevailing *diathesis*. Rarely have we to treat simple inflammation; but rather some compound or complex disease, the result, it may be, of various morbid factors mixed or blended together. We are, therefore, greatly assisted in our treatment of the many anomalous and obscure affections met with in advanced years, by bearing in mind their not infrequent complication with the gouty cachexia. In obstinate dyspepsia, with hepatic derangement and urinary irritation, "the constitutional factor" is often plainly disclosed by the so-called "Old Father Christmas" face of the patient. In cases of dyspnœa, with feeble intermittent action of the heart, palpitation, and flying pains about the chest, the gouty *cachexia* may be revealed by nodosities, or tophi of the smaller joints; or perhaps, in the helix of the ear. When no such evidence is apparent, and yet signs are present of impeded circulation, congestion of the liver and kidneys, with functional disturbances, or irregularity of the heart's action, we are justified in referring them to the constitutional factor, in the absence of evidence of valvular disease. We may thus be enabled to give a more favourable prognosis, especially if we find, on enquiry, a history of family predisposition, or heredity.

The correct diagnosis of a disease iss aid to be half its treatment; at all events, it is the most important element in regard to its successful treatment.

In treating diseases complicated with gout, medicines require to be given in judicious combination. The treatment to be adopted is

suggested by "the constitutional factor," and by other indications present. If our object be to promote the elimination of effete and excrementitious matter, that may be most readily accomplished by the administration of natural saline alkaline aperient and diuretic waters, with colchicum, in sthenic cases. The combination of iodide of potassium, with ammonia, colchicum, and senega, is highly efficient in some cases of chronic bronchitis, with a tendency to asthma.

In asthenic cases, characterised by feeble action of the heart, passive congestion of internal organs, and general debility, treatment of an active or depressing kind is contra-indicated, and such tonics as iron, quinine, and strychnine may be demanded, especially when the heart is very feeble, and perhaps dilated. Even under such circumstances, tonics are not always attended with benefit. It may be necessary to precede their employment by such medicines as promote the action of the liver, bowels, kidneys, or skin ; or to combine a tonic and eliminating plan of treatment. A very useful combination, in asthenic cardiac cases, consists of iron and arsenic, or a compound of iron with a vegetable acid and digitalis. The strength is to be maintained by tonics, stimulants, and nutritious easily-digestible articles of food, secretion and excretion being at the same time promoted, in order to eliminate effete products from the system.

PHTHISIS IN NEW ZEALAND.

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A few months ago, a medical friend in England wrote to me about a patient of his suffering from consumption, whom he had advised to go to New Zealand. His patient had subsequently consulted a specialist in London, who fell foul of the recommendation, and said that New Zealand was the worst place he could go to. In a notice in the *Lancet*, in July 1887, on a book by Dr. Lindsay on the Climatic Treatment of Consumption, the reviewer remarks that " Dr. Lindsay wisely points out the undesirability of this remarkable country (New Zealand) for the invalid, however attractive for the tourist." It would not be difficult to find among medical men in Australia and New Zealand many holding similar opinions, and I propose, in this paper, to discuss the subject, rather from a statistical than from an impressional standpoint.

It will be convenient to begin with the latest official statistics on the subject, and I will first give the official returns for 1887, showing the population in the various provincial districts of New Zealand, and the number of deaths from phthisis in each. A glance at a map of New Zealand will show the situation of the various districts, and I will discuss further on the occupations and social conditions of the inhabitants.

Table I.

Statistics of Phthisis for 1887.

—	Population.	Deaths from Phthisis.			Per 10,000 Living.
		Males.	Females.	Total.	
Auckland	134,168	81	43	124	9·3
Taranaki	18,737	10	5	15	8·0
Hawke's Bay	25,509	15	8	23	9·0
Wellington	80,328	34	33	67	8·3
Marlborough	11,547	3	2	5	4·4
Nelson	30,979	10	5	15	4·8
Westland	16,242	14	6	20	12·3
Canterbury	125,268	62	53	115	9·1
Otago	153,388	86	64	150	9·7
Chatham Islands ..	210	—	—	—	—

The total estimated population of the Colony (exclusive of Maoris) was 596,374; the total number of deaths from phthisis was 534, or 8·95 per 10,000 inhabitants, and 8·7 per cent. of deaths from all causes. As these are the statistics for one year only, they are evidently not to be taken as showing the general incidence of deaths from consumption in New Zealand, but they will be useful to compare with results taken from a series of years. I am indebted to Mr. Brown, the Registrar-General of New Zealand, for the data from which I have compiled the following table. The reliable statistics of New Zealand extend from the years 1872 to 1887 inclusive; these, I think, will be sufficient for our present purpose.

Table II.

Statistics of Phthisis and General Death-rate, from 1872 *to* 1887, *inclusive.*

General Death-rate		Deaths from Phthisis.			Deaths from all Causes.			Deaths from Phthisis.	
—	Per 1000 per ann.	Females	Males.	Total.	Females	Males.	Total.	Per cent. of Deaths.	Per 10,000 Population.
Otago ..	10·21	736	1030	1766	8242	12,090	20,332	8·68	8·34
Canterbury	11·99	597	686	1283	8303	10,538	18,841	6·8	8·17
Marlborough	9·88	37	51	88	528	826	1,354	6·5	6·42
Nelson ..	9·99	111	194	305	1733	2,515	4,248	7·18	7·17
Westland ..	11·35	83	118	201	1101	1,849	2,950	6·8	7·73
Wellington	12·63	343	434	777	4730	6,282	11,012	6·99	8·9
Taranaki ..	10·51	70	87	157	799	1,176	1,975	7·94	8·3
Hawke's Bay	13·24	94	154	248	1387	2,034	3,421	7·24	9·6
Auckland ..	12·59	599	912	1502	7764	11,322	19,086	7·86	9·9
Average for New Zealand	—	—	—	—	—	—	—	7·6	8·76

It will be seen, from this table and the first, that the average death-rate from phthisis was very slightly higher in 1887 than for the years 1872 to 1887. It is also seen that the death-rate is above the average for New Zealand, in Auckland, Hawke's Bay, and Wellington, in the north, and presumably the warmer island; a little lower in Taranaki, in the North Island; and lower in Marlborough, Nelson, Canterbury, and Otago, in the South Island. In Marlborough and Nelson the difference is a very decided one, and in these provinces, we find that the general death-rate is also lower than elsewhere.

It will now be convenient to compare these results with the statistics of Great Britain and Ireland, from which most of the white population of New Zealand is derived, either directly or indirectly, and also with those of the other Australasian Colonies, whose populations have a similar origin.

I am indebted for the following table to Mulhall's Dictionary of Statistics, and to Hayter's Victorian Year Book for 1885-6, and to the Reports of the Registrar-General of New Zealand.

TABLE III.

Comparative Statistics of Mortality from Phthisis in Australasia and Great Britain.

—	YEAR.	DEATHS PER 10,000 INHABITANTS.
England	1850–59	27·30
,, ...	1870–79	22·05
,, ...	1886	17·18
Scotland	1877	22·94
Ireland	1880	21·35
London	1879	24·76
Victoria	1861–85	12·93
,, ...	1884	14·36
,, ...	1885	14·19
Melbourne	1874–85	22·31
New South Wales	1886	10·73
Queensland	1886	14·86
South Australia	1887	11·43
Western Australia	1886	6·42
Tasmania	1887	11·01
New Zealand	1887	8·95
,, ...	1872–87	8·76

These statistics are unfavourable to the Colonies and unduly favourable to Great Britain, inasmuch as many of the sufferers from consumption acquired in Great Britain die abroad, while in the Colonies a considerable proportion of those who die from consumption have acquired the disease elsewhere. Mr. Brown, the Registrar-General for New Zealand, notes in his report for 1887 that the exceptionally high rate in Queensland is largely attributable to the mortality among the South Sea Island labourers; and he has, in his returns for 1886 and

1887, shown the length of residence in New Zealand of those who died from this disease. The following are the results for 1886 :—

Table IV.

The Ages, with the Length of Residence, of those who died from Phthisis, in 1886, in New Zealand.

Length of Residence in the Colony.	Age at Death.										
	Under 5 Years.	5 to 10	10 to 15	15 to 25	25 to 35	35 to 45	45 to 55	55 to 65	65 to 75	75 Years and upwards.	Total.
Males.											
Under 1 month ..	—	—	—	—	1	1	—	—	—	—	2
1 to 6 months ..	—	—	—	5	2	—	1	—	—	—	8
6 to 12 months ..	—	—	—	3	1	1	—	—	—	—	5
1 to 2 years	—	—	—	3	6	-	1	—	—	—	10
2 to 3 years	—	—	—	2	10	4	1	—	—	—	17
3 to 4 years	—	—	—	2	3	1	1	—	—	—	7
4 to 5 years	—	—	—	—	3	—	-	—	—	—	3
5 to 10 years ..	—	—	—	4	11	9	6	1	—	—	31
10 to 15 years ..	—	—	—	8	9	11	3	4	2	—	37
15 to 20 years ..	—	—	—	1	2	5	4	—	—	—	12
20 to 25 years ..	—	—	—	—	2	19	20	4	2	—	47
25 years and upwards	—	—	—	—	3	7	9	7	4	—	30
Not known	—	—	—	2	2	6	5	—	—	—	15
Born in colony ..	5	2	4	34	13	9	—	—	—	—	67
Totals	5	2	4	64	68	73	51	16	8	—	291
Females.											
1 to 6 months ..	—	—	—	—	1	—	—	—	—	—	1
6 to 12 months ..	—	—	—	—	1	—	—	—	—	—	1
1 to 2 years	—	—	—	2	3	—	1	—	—	—	6
2 to 3 years	—	—	—	1	1	2	1	-	—	—	5
3 to 4 years	—	—	—	3	3	1	—	—	—	—	7
4 to 5 years	—	—	—	1	—	1	—	—	—	—	2
5 to 10 years ..	—	—	—	7	8	4	1	—	1	—	21
10 to 15 years ..	—	—	2	5	18	9	3	1	—	—	38
15 to 20 years ..	—	—	—	4	2	5	—	—	—	—	11
20 to 25 years ..	—	—	—	2	7	9	4	2	2	1	27
25 years and upwards	—	—	—	-	4	2	4	3	1	—	14
Not known	—	—	—	—	—	1	—	—	1	—	2
Born in colony ..	7	6	10	36	11	4	—	—	—	—	74
Totals	7	6	12	61	59	38	14	6	5	1	209
Totals both sexes	12	8	16	125	127	111	65	22	13	1	500

It will be seen from this table that 25·2 per cent. of those who died had been less than 10 years in the colony, that 11 per cent. had been less than 3 years in the colony, and that 28 per cent. had been born in the colony. I have not the data at hand for comparing New Zealand with the other colonies on this point, but there seems to be no reason to

doubt, that all the colonies suffer more or less from the same cause. It is worth noting that Western Australia, which, compared with the other colonies, is isolated from the great stream of European traffic, has a comparatively low death-rate from phthisis.

The following quotation, from Mr. Brown's report for 1887, shows the present evidence of phthisis in the native-born population :—"The New Zealand born were, in 1886, in the proportion of 51·89 per cent. of the whole population. If this proportion be applied to the mean population in 1887, the result would give 309,458 persons, out of 596,374, as having been born in the colony. The total number of deaths from phthisis gives a proportion of 8·95 per 10,000 of the population; of these deaths, 156 were of persons born in the colony. This number gives a proportion of only 5·04 deaths from this cause per 10,000 of the New Zealand born population. The remainder gives a proportion of 13·17 deaths from phthisis per 10,000 of the population born outside the colony."

In order to get exact results on this point, it would be necessary to compare the ages of the two classes, viz., the native born, and those born outside the colony. It is probable, that a larger proportion of the native born, than of immigrants, is of an age at which consumption is not common. The following table, taken from Mr. Brown's report for 1887, shows the ages of patients who have died from phthisis in New Zealand in 7 years :—

TABLE V.

The Number and Proportion per 100 Deaths from Phthisis in New Zealand, at each Age Period, for the seven years 1881 to 1887, inclusive.

Age at Death.	Males.		Females.	
	No. of Deaths.	Per 100 Deaths from Phthisis.	No. of Deaths.	Per 100 Deaths from Phthisis.
Under 5 years	50	2·54	55	3·70
5 to 10 years	14	0·71	37	2·49
10 to 15 years	19	0·97	64	4·30
15 to 25 years	401	20·42	447	30·04
25 to 35 years	565	28·77	443	29·77
35 to 45 years	433	22·05	263	17·67
45 to 55 years	308	15·68	119	8·00
55 to 65 years	131	6·67	42	2·82
65 to 75 years	35	1·78	15	1·01
75 and upwards	7	0·36	2	0·13
Not specified	1	0·05	1	0·07
	1964	100·00	1488	100·00

We may reasonably look for a higher death-rate from phthisis, therefore, among the native born in future years, without any real increase in the development of the disease.

To sum up the results shown by the foregoing statistics, it may be fairly said that they show that, in New Zealand, phthisis is a less fatal disease to those of European blood, whether born in the colony or immigrants, than it is in the other Australasian Colonies, with the doubtful exception of Western Australia, or in Great Britain and Ireland, from which the bulk of the population is derived. It might

have been better to have included in this inquiry the whole family of tuberculous diseases, of which pulmonary tuberculosis is only a branch. But, without going into details, which would make this paper unduly long, it may be said that the same general statement is true of the whole family, as of this, the chief branch. Strumous diseases of glands, of joints, of the nervous system, &c., are as strikingly below the average as phthisis. It is also as well to note that these statistics refer almost entirely to the white population of New Zealand. The Maori and half-caste population are peculiarly liable to tuberculous diseases of all kinds, and these diseases are very fatal to them.

To what circumstances is this lesser liability to phthisis due? In the first place, much must be ascribed to the climate of New Zealand. Among the few observations on this subject, which come to us from the earliest known period of New Zealand history, are the statements of Captain Cook, and some of those who accompanied him, that among the New Zealanders, disease was practically unknown. The fine physique of the Maoris, still noticeable, was evidence that, in spite of the uncertainties of their food supplies, and their exposure to the vicissitudes of an uncertain climate, the general climatic conditions were such as to favour the development of a race with very high physical qualities. In 1849, Dr. Thomson, surgeon to the 58th Regiment, then quartered in New Zealand, published careful observations which he had made on the health of troops serving in the colony. He found that, out of 1000 soldiers serving in New Zealand, 440 were admitted to the hospital for treatment for various diseases, while among 1000 men serving in Great Britain, the number was 921. For diseases of the lungs, he remarks, the admissions were one-third less numerous than among the troops quartered in Great Britain. He also quotes the opinion of Surgeon Pendergast, of the 65th Regiment, who stated, "the climate of New Zealand is peculiarly favourable towards the non-development of pulmonary affections, and, in the majority of fatal cases, the seeds of disease existed before their arrival in New Zealand. Among the five fatal cases in the 58th Regiment, the symptoms of consumption had been observed in three of them before their arrival in New Zealand."

Dr. Thomson also published in his report the following table, showing the annual mortality in New Zealand among troops, as compared with other British Stations. (His experience was confined to the North Island) :—

TABLE VI.

—	Annual Mortality per 1,000 from all Diseases.	Annual Mortality by Disease of the Lungs per 1,000.
Malta	18	6·0
Ionian Islands	28	4·8
Bermuda	30	8·7
Canada	20	6·7
Gibraltar	22	5·3
Cape of Good Hope ..	15	3·8
Mauritius	30	5·6
United Kingdom ..	15	8·0
New Zealand	10	5·7

Table VII.

Meteorology.—Comparative Table of Climate, as observed at the Meteorological Stations in New Zealand, during the Year 1886.

Stations.	Atmospheric Pressure (reduced and corrected): Mean Height of Barometer	Atmospheric Pressure: Maximum recorded during the Year, and Date	Atmospheric Pressure: Minimum recorded during the year, and Date	Atmospheric Pressure: Extreme Range	Temperature of Air in Shade: Mean	Temperature of Air in Shade: Maximum recorded during the Year, and Date	Temperature of Air in Shade: Minimum recorded during the Year, and Date	Temperature of Air in Shade: Extreme Range	Temperature of Air in Shade: Mean Daily Range of Temp for Year	Solar Radiation: Maximum for Year, and Date	Solar Radiation: Mean	Terrestrial Radiation: Minimum for Year, and Date	Terrestrial Radiation: Mean	Computed from Observations: Mean Elastic Force of Vapour for Year	Computed from Observations: Mean Temperature of Dew point for Year	Computed from Observations: Mean Humidity for Year, Saturation=100
	in.	in.	in.	in.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	in.	Fah.	
Auckland ..	30·115	30·760, 26 May	29·330, 2 Sept.	1·430	59·1	82·0, 22 Jan.	36·0, 28 Aug.	46·0	12·5	153·0, 14 Feb.	122·5	28·0, 7 July 6,7,28 Aug.	43·7	·374	50·6	73
Rotorua ..	30·003	30·850, 16 April	29·250, 2 Sept.	1·600	55·1	90·5, 23 Jan.	21·5, 6 Aug.	69·0	23·3	150·5, 8 Dec.	118·9	19·5, 6 Aug.	41·4	·306	44·5	68
Wellington	29·958	30·743, 26 May	29·067, 2 Sept.	1·676	54·4	79·0, 25 Jan.	32·0, 26 July, 28 Aug.	47·0	12·1	150·0, 10 Mar.	114·2	27·0, 28 Aug.	43·3	·338	47·8	79
Lincoln, Canterbury	30·076	30·834, 15 April	29·214, 22 Aug.	1·620	51·9	91·0, 7 Jan.	23·0, 22 July	68·0	17·1	158·9, 30 Dec.	115·6	13·8, 22 July,	37·3	·288	43·4	73
Dunedin ..	29·916	30·849, 6 May	28·957, 22 Aug.	1·892	51·3	84·0, 7 Jan.	30·0, 25 June, 22 July	54·0	15·2	—	—	—	—	·289	43·7	75

Stations.	Rain: Total Rainfall for Year	Rain: Number of Days on which Rain fell in the Year	Rain: Maximum Rainfall recorded in any 24 Hours during the Year, and Date	Wind: Number of Days it blew from any Point: Morning Observations: N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm	Wind: Mean Velocity in Miles in 24 Hours for Year	Wind: Maximum Velocity in Miles in any 24 Hours during Year, and Date	Cloud Mean: 0=Clear Sky 10=Overcast	Number of Days: Gales or High Winds	Thunder	Snow	Hail	Fog	Earthquakes
	in.	days.	in.																		
Auckland ..	32·640	165	1·670, Feb.	28	85	7	15	62	93	32	41	2	165*	813,* 8 Sept.	6·3	35	7	0	1	3	0
Rotorua ..	51·790	152	3·100, Sept.	36	63	4	19	66	87	15	30	45	—	—	5·9	4	14	2	1	2	33
Wellington	54·477	160	3·400, 14 May	3	19	13	68	14	51	5	169	23	191	700, 9 Dec.	4·2	57	7	7	17	6	11
Lincoln, Canterbury	35·287	138	3·114, 15 May	26	104	0	12	10	102	7	24	80	218	675, 3 Nov.	6·6	27	3	8	5	11	
Dunedin ..	52·632	178	4·600, 19 Aug.	12	93	7	21	13	114	13	12	80	119	610, 26 Nov.	5·9	18	1	10	5	13	2

* Ten months only.

In a subsequent paper on the diseases of the New Zealanders, contributed to the *Medico-Chirurgical Review*, in 1854, he says:—"Diseases of the lungs are much more frequent among the New Zealanders than the English. The great prevalence of diseases of the lungs does not arise from the climate, but from causes peculiar to the New Zealanders themselves. This I assume, from the comparative rarity of cough and consumption among the European population." I have quoted Dr. Thomson's experience at some length, as the conditions he observed are not likely to occur again, and the results among soldiers, presumably of the same average tendency to disease, in various parts of the world, are valuable for comparison. The main facts as to the climate of New Zealand are, that there is everywhere an absence of extremes of heat or cold; that nearly every part of both islands is freely swept by the ocean winds; that malarial conditions do not exist; that rain is abundant enough, but not excessive; that the drainage by rivers is good, and swampy districts are few. There are five meteorological Stations in New Zealand, namely, at Auckland, Rotorua, Wellington, Lincoln in Canterbury, and Dunedin. With the exception of Rotorua, none of these, however, give a just representation of the climate of New Zealand away from the coast. The annexed table (VII.), from the Government Blue Book, shows the results of observations at the various stations during the year 1886.

The inland climates differ in many respects from those of the coast, but exact observations have yet to be made on the subject. Much of the country occupied by settlers is from 1000 to 2000 feet above sea level. The air is drier than about the coast; there is less rain; and the temperature is higher generally in summer, and lower in winter, than nearer the sea. Along the range of mountains in the South Island, the climate is that of similar districts elsewhere in like latitudes. The air is fresh and exhilarating; there are magnificent lakes, rivers, and glaciers to be explored; but, as the country is little settled in many places, much of it is not available for invalids.

The table given represents fairly the climate of the coast, but many important points must be left out in such records. Places which are sheltered from the south-west gales are much warmer than exposed places in the same or higher latitudes, and there are many important local varieties of climate in each district. Thus, for instance, the northern part of Stewart Island is warmer in latitude 47° in winter, than Christchurch in latitude 44°. Nelson, Blenheim, and Napier are places whose climates are not represented by any of the statistics as to Wellington, Auckland, &c. The west coast of the South Island is only settled in a few places, but there is every reason to believe that the rainfall all along that coast is greater than elsewhere in New Zealand. It is impossible in this paper to deal with all the local varieties of climate, but this can be said of every part of New Zealand—that the climate is favourable to out-door work and recreation of all kinds, at all seasons of the year; and all kinds of out-door sports are much in favour with all classes.

Another factor favourable to health generally, and which tends to reduce the mortality from phthisis especially, is the absence of large towns. The largest population in any one centre does not exceed 50,000;

even in the largest towns, Auckland and Dunedin, there is very little overcrowding. The houses are, many of them, built of wood, and well ventilated; often of one story only, and with abundance of open spaces either round about them, or in the vicinity. The drainage is in many cases defective, but on the whole, the conditions are vastly more favourable to human life—as shown by that most delicate test, a low infant mortality—than in the towns and villages of the old world.

The social condition of the people must also count as an important favourable item. Good food is abundant and cheap. There is nowhere the grinding poverty that is to be found in the larger centres of population. Wages, even in depressed times, are high enough to assure, to every man who can work, good food and clothing, and lodging for himself and those dependent on him. Probably, as a consequence of this, drunkenness, and the evils that spring from it, are on the decrease. The native-born New Zealander very rarely drinks to excess, or, indeed, cares much for alcoholic stimulants of any kind. He plays football and cricket, and is interested in all athletic contests; in this, resembling his brother colonists in other parts of Australasia.

The occupations of the people must also have an important part to play in their tendencies to disease. In a paper read before the Otago Branch of the New Zealand Institute, by Professor Mainwaring Brown, of Dunedin, in 1888, the number of hands engaged in manufactories is given as 22,102, or 3·8 per cent. of the total population. The total producing population he estimates to be about 101,000, including those engaged in agricultural and pastoral pursuits and mining. In addition, he estimates other industrial classes, consisting of those engaged in the building trade, labourers, distributors, and others, as about 48,000.

As, however, none of the manufacturing industries are conducted under the bad hygienic influences that prevail in large communities, they can hardly be properly compared with those of older countries. The large proportion of people engaged in agricultural and pastoral work, along with those depending on them, are little disposed to phthisis. But observation of cases seen in practice shows that in New Zealand, as elsewhere, phthisis is often produced in the workshop, the compositors' room, and in coal and other mines.

The settlers, as a rule, were drawn from a healthy class. This may be said to be counterbalanced by the fact, that the Colony has also attracted a large number of families predisposed to tuberculosis; and also, that along with the good colonists, many of another stamp have been introduced, by unwise immigration laws and other influences.

The main practical deductions that I would make from the facts stated are, that the native-born population of European blood of New Zealand, and the immigrants of European birth living in New Zealand, are less subject to phthisis than their fathers, or than those who are born in or settled in other Australasian Colonies, and that the causes of this are mixed, but are mainly that the population, as a whole, is well fed, well cared for, and has abundance of pure air to breathe.

The curious fact that the Maoris and half-castes are specially vulnerable to tuberculosis, is capable of explanation by several lines of facts. In the first place, all the South Sea natives, brought into contact with Europeans, seem to acquire tuberculosis and infectious diseases easily and virulently. This is also noticeable among the aboriginals of

Australia. It is, doubtless, due to the fact that tuberculosis is, to a certain extent, an infectious or bacillary disease.

The altered habits of the natives, their dirty habits, their prolonged idleness, and especially their custom of congregating in large numbers in close, ill-ventilated huts, where they breathe the same air over and over again, are among the most important predisposing causes. Dr. Hocken, of Dunedin, who has had a large and exceptional experience of New Zealand, informs me that he is of opinion that the adoption of European blankets and European clothes, instead of the native flax mat, is a powerful predisposing cause. The native gets overheated in the unaccustomed garments, throws them off, and becomes chilled and depressed in consequence. It seems to me not unlikely, too, that the fact that tuberculosis is a new disease among them, may account partly for its fatal effect. European populations have been fighting this and other infectious and constitutional diseases for centuries, and are, to a certain extent, protected against them. There has been no such contest among the inhabitants of the Oceanic Islands, until comparatively recently isolated from the outside world, and consequently there has been no such protection as European populations have acquired.

It is no part of the scope of this paper to discuss either the pathology or the treatment of consumption. I believe that the part, played by the bacillus of Koch, is analogous to that taken by the torula in yeast fermentation. It needs, like the yeast torula, certain conditions for its development, and these conditions have been hitherto called, and I think justly, the causes of consumption. That many of these conditions are absent in New Zealand is, I think, the chief reason for the smaller mortality from consumption in these islands. It cannot be too strongly urged, that there is no specific in the New Zealand climate which will cure advanced cases of phthisis. The range of climatic treatment is limited here as elsewhere, and I will only add my protest, to that of others, against the cruelty and uselessness of recommending a sea voyage, and residence in the Colonies, for a very large number of the cases of consumption which come under the notice of physicians at Home and elsewhere.

TREATMENT OF PHTHISIS BY CLIMATE.

By Duncan Turner L.R.C.S. Ed., L.R.C.P. Lond.

Within the last twelve months, I have seen a number of patients who had resided, some of them in winter and some in summer, in the higher parts of the Alps, chiefly St. Moritz. They were unanimous as to the benefits they had derived from their sojourn there. Many of them had visited other resorts, but they all gave the preference to the high altitude stations. The principal drawback, with respect to Alpine health retreats, is the expense. It is not a treatment that any poor man, or even a person with a moderate income, can adopt. And many poor people, or those of limited means, find their way to our shores in the hope (alas! too often delusive) that they can regain health, and at the same time earn a livelihood in our genial climate.

The object of this paper is to refer shortly to the Australian climates suitable to consumptive invalids. In order to shorten as much as possible my remarks, I will sketch briefly the necessary information. The inhabited portion of settled Australia may be divided mainly into three divisions—the littoral, or shore division, which is at present the most populous; the great mountain chain, commonly called the Dividing Range; and the great inland plains beyond. The first of these may be dismissed at once, as it is generally acknowledged that, with the exception of a few sheltered nooks on the coast, it is entirely unsuited to the phthisical invalid. The mountain chain is of more interest to us, although, so far, a great deal of it is practically so little known that we can only speak of a few mountain localities where real settlement has taken place. In comparing our mountain regions with those of Europe, Asia or America, we are at once struck with the fact that our mountains are generally so restricted in height, that the high altitude treatment can never be carried out here in its entirety. But, taking them for what they are, I believe that they have been strangely overlooked by medical men in this country. In recommending to patients, who cannot take a sea voyage, a suitable residence in summer, where can we send them to, unless it is to the mountains? Unfortunately, the accommodation at most of our mountain resorts is entirely inadequate to the wants of an invalid patient. Also, our information respecting the climates of the most elevated, is meagre and unsatisfactory. For some time past, I have been making inquiries in this direction. The highest settled parts of Australia are, the Blue Mountains, near Sydney, and Mount Macedon, near Melbourne. These places have not, as yet, been specially recommended to chest sufferers, but I may mention that I have myself known several patients to be much benefited by residence there. And in, at least, two cases there was apparently perfect restoration.

With the exception of a few towns in New South Wales, there are no settled districts in any of the colonies at a sufficient elevation to afford reliable data on the question of the immunity of the inhabitants from phthisis. To the practitioners of these towns, however, I addressed some time ago a few questions. The majority of the communications were obligingly responded to, and I will now give a brief sketch of the replies.

From Bathurst, 2153 feet above sea level, Dr. Basset writes:—"In a practice of twenty-five years, I have only seen about six cases of phthisis originating here. In this number, I don't include aboriginals."

From Crookwell, near Goulburn, 3000 feet above sea level, Dr. A. E. Fitzpatrick writes:—"In a practice of over four years in this neighbourhood I have not seen a single case of phthisis, nor have I heard of one."

From Bowenfels, close on 3000 feet above the sea, Dr. Asher writes:—"I have seen but one case of phthisis that originated here, and in that case the patient recovered."

From Armidale, New England, 3300 feet above sea level, Dr. Mallam writes:—"I do not know of any case of phthisis originating in our town or neighbourhood. My colleague, Dr. Wigan, who has been practising here for thirteen or fourteen years, says he has never seen a native-born New Englander developing phthisis."

From Walcha, another town of New England, 3300 feet above sea level, Dr. Boodle writes :—" In nine years' practice I have seen but one case of phthisis, in a yellow boy, and he recovered."

I might give you more of these extracts, but they are all much alike, and go far to prove that in this country, as well as Europe and America, the inhabitants of high altitudes have a remarkable immunity from phthisis.

As yet, no attempt has been made to found a mountain sanatorium in Australia. Toowoomba, in the Darling Downs, Queensland, has the nearest approach to one. Its winter climate is delightful, but the altitude (barely 2000 feet) is insufficient for rarefaction of atmosphere. In the Australian Alps, however, there are several elevations equal to that of Davos Platz, or St. Moritz, in Switzerland ; but, as yet, there is no accommodation for invalids. This time last year I spent a week at the Hospice, near Mount Hotham, in the Australian Alps, in Victoria. The old man who kept the house of accommodation for travellers had lived there, I think, 20 years. His powers of observation concerning the weather were not of a high order, but, from what I could gather, there are several months of winter there, especially if the weather happens to be dry, that are very much like the weather recorded in the celebrated Davos Platz. The altitude is exactly the same as that of the famous Swiss resort. Under any circumstances, this would be a delightfully cool place for invalids during the summer months. Rarefaction and sunlight would be the same as at similarly situated stations in the Swiss Alps, which are proved to be highly beneficial. It is to be hoped that ere long Victorian enterprise will provide adequate accommodation in this beautiful spot, which, I have no doubt, would be soon largely patronised. I have merely given this sketch in order to direct the attention of Australian practitioners to the advantages of mountain climate—advantages which, so far as I am aware, have not been touched upon as yet by any local medical writer.

The last climate I will refer to in this paper is that of the great inland plains of Australia. This climate is so well-known to most of you, that it will not be necessary for me to enlarge on its properties. Briefly, it may be described as something between the climate of the Riviera and that of Egypt, dryer than the former, but not quite so dry as the latter. Its chief recommendations to the chest invalid are—dryness, plenty of sunshine, and moderate temperature, thus enabling a patient to pass a great deal of his time in the open air, a most important part of treatment in phthisical cases. That hundreds have recovered from passing two or three winters in Riverina, I have no doubt. I have myself known several instances, and other Melbourne practitioners have done the same. The great plains are so much alike, that there is no need to mention any particular locality. In Victoria, we send our patients to Echuca or Deniliquin for the winter. If the rain maps can be depended on, the districts of Swan Hill and Wentworth are the driest of the Riverina district, and possibly a sanatorium may start up at one place or the other at some future time.

In giving a brief *resumé* to this paper, I may state that I consider the ocean climate the best. After that, the high altitude climate at or above 3000 feet. Thirdly, comes the climate of the great inland plains. Lastly, there is the climate of the marine resorts.

THE OPEN-AIR TREATMENT OF PHTHISIS.

By James P. Ryan, M.K.Q.C.P.I., L.R.C.S.I.

Chevalier of the Legion of Honour.

Graves says: "It is of great importance to know how to make a man phthisical, as, by pursuing an opposite line of conduct, we shall be able to prevent it," and, I may add, to cure it.

Now, what are the conditions of living which tend to produce phthisis? They are mainly such as cause an impaired condition of general health, and a lowered vitality. Amongst these, *overcrowding* and *impure air* hold the most important positions. We know that men may be subjected to great hardships, such as exposure to wet and cold, want of food and rest, fatigue, &c., without running the same chance of falling victims to phthisis, as if they were huddled together in a confined space, and, though supplied with a sufficiency of wholesome food, were deprived of fresh air and exercise. And this applies not only to man, but very largely also to the animal kingdom. Villemin, in the course of his experiments, found that guinea pigs which were kept crowded together had less power of resisting tuberculosis than those which were allowed more space and air. Affections of the respiratory organs are far more prevalent amongst stabled horses, than amongst those that are running out.

Experience, from all time and in all places, goes to show that those who lead an outdoor life are more robust, and less prone to lung diseases, than those whose occupations confine them within doors. I am informed by those who knew the Australian aboriginals well, that phthisis used to be very uncommon amongst the wild or half-civilised ones. Those who adopt the customs of the white man, easily fall victims to it. The Araucanian Indians, whose country—a level plateau some hundreds of feet above the sea—lies in the southern part of the Spanish-American Republic of Chili, are seldom affected with phthisis. I believe I am correct in this statement. I lived close to their frontier for some years, and my information was obtained by personal observation, as well as by inquiry. On the other hand, amongst their neighbours across the border, the Chilenos, the disease is widely prevalent; and markedly so, of course, amongst the dwellers in towns. I attribute this to the fact that the Chilenos are morbidly sensitive to cold—almost every ill that flesh is heir to being put down to an "aire" or draught; and air, being thus looked upon as an enemy, is carefully excluded. Hirsch says that "phthisis is unknown among nomad tribes, such as the Kirghiz of the Central Asian Steppes, or the Bedouins of Arabia, until these people settle in towns." The same immunity from phthisis is observed in the dwellers on high mountains, due, without doubt, to the sparse population, and the active outdoor life which they lead, as well as to the purity of the atmosphere which they breathe. As soon as they congregate together in towns, the immunity is lost, and the disease is found to prevail at Quito, Cuzco, and Potosi, which are respectively 10,000, 11,000, and 13,000 feet above the level of the sea.

Dr. Guy found that of 104 compositors who worked in rooms having less than 500 cubic feet of air space for each person, 12 per cent. had

had blood-spitting. In 100 who worked in rooms having a capacity of more than 600 cubic feet for each person, only 2 per cent. suffered in this way. Dr. Ransome, in his paper on "Tubercular Infective Areas," read before the Epidemiological Society in 1887, referring to Salford, says:—"In certain streets and courts, consisting of back to back houses, unfurnished with through ventilation, tubercular disease was much more common than in other parts of the same town; and such disease occurred again and again in the same houses." And this was subsequently fully confirmed by a report made to the Local Government Board by Dr. F. W. Barry and Mr. Gordon Smith.

The day has passed when physicians pinned their faith to medicines in the treatment of this disease; and of the numerous remedies, from the hypophosphites to Bergeon's gaseous enemata, which have been vaunted as specifics for consumption, not one, excepting perhaps cod liver oil, has enjoyed anything beyond an ephemeral reputation. Instead of concentrating the attention on the local symptoms, as was formerly too much the custom, the modern physician addresses himself to repairing and strengthening the constitution of his patient, by sending him to the country and telling him to eat well, and be as much as possible in the open air. The few lucky ones who can afford the expense are recommended to try the mountains of Switzerland, or the high lands of the Cape, or they are ordered upon a long sea voyage; and, without doubt, the "mountain" and the "sea" cure, as they are called, have often been attended by the happiest results. In the early part of the present year, Dr. Theodore Williams gave the results of the treatment of 141 cases of phthisis in his practice, by residence in high altitudes, 5000 to 9000 feet above the sea, and in 70 per cent. great improvement took place, whilst in 30 per cent. there was complete arrest of the disease. Many are relieved, and their lives are prolonged, if they are not cured, by a residence on the table-lands of South Africa, or in the Australian bush.

What then is it which has so beneficial an effect upon the consumptive patient, and which is found upon the mountain top, on the sea, and in the desert? Without any doubt, it is pure air.

The number of bacteria in a given quantity of air is the best test of its impurity; and in this light, the following table is interesting, as showing the result of observations made by Miquel on the Swiss Mountains and in Paris:—

At an elevation of from 2000 to 4000 metres, in 10 cubic metres of air ...	0	bacteria
On the Lake of Thun, 560 metres ...	8	,,
Near Hotel Bellevue, Thun, 560 metres ...	25	,,
In a room of the same hotel	600	,,
In the Park of Montsouris, near Paris ...	7,600	,,
In Rue de Rivoli, Paris	55,000	,,

It would be interesting to know the result of an examination of the air of a house in that street. And so, also, the atmosphere above the ocean, in forests, and in the desert, as gauged by this test is nearly, if not quite, pure.

The essential condition for success in the treatment of consumption is, that the patient be kept constantly surrounded by the purest possible

atmosphere. In theory, this is perhaps admitted by a large number of medical men, but in practice I am quite sure that the principle is not carried out sufficiently far. Dr. Russell Reynolds, in his "System of Medicine," gives sensible advice about diet, exercise, bathing, &c., and speaking of a pure atmosphere, says:—"The *great end* he (the physician) should aim at is, to surround his patients with as much pure air as possible, consistent with warmth and absence of draughts. In summer, *good ventilation* should be secured by letting down the windows *an inch or so* at the top." I presume he means the bedroom windows at night-time, though he does not say so, and he is silent about *ventilation* in *winter*. Coming from such an authority, this may, I presume, be taken as a fair example of the prevalent idea held by medical men, or, at all events, by many of them, of surrounding a phthisical patient with pure air. Others suppose that, by keeping the windows well opened during the day, they secure a supply of fresh air for the night; a mere delusion, I need hardly say, though it is better than excluding the air both by day and by night. The patient should be constantly surrounded by pure air. This is the ideal, but it is scarcely attainable in practice, though, under favourable conditions, we may come near to it.

Conjure up for a moment the actual surroundings of an ordinary phthisical patient. He is in a chair, or in bed, in an apartment which is at the same time his sitting-room and bed chamber. Even in fine weather he wears an unnecessary amount of clothing, including two or three shirts, which are not too frequently changed, and a chest protector of wool or chamois leather. His bed coverings are soaked in foul-smelling sweat, the windows are closed, the chimney stopped up, and he is inhaling, during the greater part of the twenty-four hours, an atmosphere reeking with impurities. I ask you, is it reasonable to expect favourable results from any mode of treatment in a patient with such surroundings?

The first necessity, then, is that the consumptive be constantly, both by day and by night, in the purest possible atmosphere. Where it is feasible, send him to the mountains, to the desert, or on a long sea voyage; but tell him that, in order to obtain the greatest amount of benefit under such favourable conditions, the air which he breathes during the long hours of the night should be nearly, if not quite, as pure as the atmosphere by which he is surrounded during the day.

Unfortunately, by far the largest number of those suffering from phthisis are debarred, by want of means, from resorting to the mountain or sea "cure." But many might live in the country, instead of in town; or in a suburb, instead of in the midst of a crowded population; and even the condition of the denizens of the lanes and alleys may be improved, and they may be helped on towards recovery by improving their surroundings. The fear of air, and particularly of night air and cold, entertained by the patient and by his friends, is groundless, and must be combated. Many phthisical patients are morbidly sensitive to the slightest cold air or wind; but this is produced in some, and in all greatly aggravated, by over-clothing, and remaining indoors in a close atmosphere. This hyper-sensitiveness of the skin and bronchial mucous membrane is surely and rapidly lessened by tepid or cold ablutions, followed by frictions with a rough towel or brush, and by being in the open air.

Not so very long ago, I was opposed to the establishment of special hospitals for the treatment of consumptives, but I have come to recognise the hopelessness of their condition, as patients in a general hospital. They enter such, not to get better, but to die. But even our general hospitals might be so improved as to be made more suitable for such patients, by the addition to them of wide verandahs, where those who could not walk about, or sit in the gardens (I assume the existence of such), might lie in the air all day long, and all night long in fine weather, as is the custom in the Augusta Hospital at Berlin; or else tents, or summer houses of light porous material, should be erected in the grounds, which might be occupied during the summer months, if not all the year round. Time will not permit of my entering into details of the most suitable sites for, and the best mode of construction of, special institutions for the treatment of phthisical patients. In Victoria, the sea-side has many advantages, not the least of which is the possession of a tolerably equable temperature throughout the year, and a background of wholesome scrub or forest country. The arrangements in such an institution as the National Hospital for Consumption at Ventnor, England, particularly in the new part of the buildings, are, on the whole, excellent. It consists of blocks, each to accommodate 12 patients, each patient having a separate sleeping apartment. Then there are sitting and dining rooms, large balconies, and a system of ventilation partly natural, partly artificial, by which 5000 cubic feet of fresh air, at a temperature of 62° Fahr., is supplied to each patient per hour. Of course, all this means the expenditure of very large sums of money; and yet it is exceedingly probable that better results might be obtained from housing the patients in tents, huts, or in other light buildings constructed of porous material. Whatever objections, on the score of coldness, may be made to them in the countries of Northern Europe, where the winters are long and severe, such objections cannot be valid here in Victoria, where, by comparison, they are short and mild. But in reality there is no difficulty whatever in warming the interior of such constructions by means of open fire-places, stoves, and other appliances, which may be utilised without taxing too severely the ingenuity of the architect or the medical man.

ON PNEUMATIC THERAPEUTICS BY MEANS OF THE PORTABLE APPARATUS.

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The article which first drew to this subject the attention of the Australian profession, if I am correctly informed, was published by me in the *Australasian Medical Gazette* for September 1886. It made no pretensions to completeness, and was written with the hope of encouraging the adoption of a partially, if not wholly, neglected mode of treatment.

My remarks, on the present occasion, are intended to apply principally to aëro-therapeutics—that is to say, to the mechanical treatment of

certain affections of the respiratory organs by means of alteration in the pressure and composition of atmospheric air, applied by apparatus that will act on the pulmonary surface only, or on this and on the general surface of the whole body at the same time. The apparatus used for carrying out the above principles are various. Later on I will mention those used by me, and among the very many others, I will make special mention of the one used by the American physicians, called by them the differentiator, and its action pneumatic differentiation, which is thus described by its inventor, Dr. H. F. Williams, of Brooklyn :—" It consists in immersing a patient in a partial vacuum, thereby removing to a sufficient degree the external pressure of the atmosphere, and at the same time supplying the lungs with air at its normal pressure, and to a greater or less extent impregnated with the substance which it is desired to administer." Though at first sight different, yet is the differentiator the same in its effects as the administration of compressed air, the superiority of the apparatus being the facility and thoroughness with which remedies can be carried into the lungs. The Atmiometer of Professor Jacobelli is an apparatus quite different from all others, and almost perfect, with which we can carry out this mode of treatment according to our most advanced knowledge. It is very complex ; in fact, is a combination of different apparatus, each having special purpose, while all harmonise to form medicated atmospheres, and convey in definite quantities into the different organic cavities, normal or pathological, any drug in the shape of spray, of varying fineness, or of impalpable powders and solutions, having as menstruum the air compressed or rarefied, or water for those cavities that tolerate it.

By whichever apparatus compressed air is received into the lungs, we have—First, a greater pressure acting on the superficies of them than the one acting on the superficies of the body. This high-pressure air will completely distend the lungs and expand the thorax. Second, this positive pressure on the pulmonary surface will aid the action of the inspiratory muscles, and so facilitate inspiration itself. The effect of inspiration, under these conditions, is a greater dilatation of the lungs and thorax than can be brought about even with the deepest natural inspiration. Waldenburg has proved by experiments that a strong healthy man, after the deepest inspiration of atmospheric air, measured across the chest 98 centimetres. After inspiration of air compressed to $+\frac{1}{60}$ atmosphere, the measurement was 100 centimetres, and when the air was compressed to $+\frac{1}{40}$ atmosphere, it was 101·5 centimetres. Then, again, it has been calculated that the quantity of compressed air, which can be forced into the lungs, may amount to 1000 centimetres more than the quantity taken under the normal atmospheric pressure. The ultimate results of the two factors mentioned, viz., increased intra-pulmonary pressure, and increase of respiratory air, will be an increase of the vital capacity of the lungs. Again, the respiratory air, in consequence of its greater volume and tension, offers a greater resistance to the elastic tissues of the pulmonary cells and to the expiratory muscles—hence, a more copious removal of the respiratory air, and an increased activity of the ventilation of the lungs ; that, of course, is if the pressure of the condensed air is not so great as to overcome the natural elasticity of the lungs, and cause emphysema.

On the other hand, by expiration into rarefied air, we can obtain the following effects:—Removal of larger quantities of air from the lungs than in ordinary expiration (from a few hundred to 1000 cubic centimetres); an acceleration of the exchange of gases, by the pumping out of a considerable portion of the residual air, charged with carbonic acid, and the admission of a larger quantity of atmospheric air, charged with oxygen; diminution of the circumference of the thorax, the retraction of the lungs, the increase of the inspiratory and expiratory force, the augmentation of the vital capacity of the lungs (Oertel). So by this method we can remove dyspnœa, which is the result of expiratory insufficiency, as is the case with emphysematous patients, who at once feel a progressive relief, and leave the apparatus without a trace of dyspnœa.

Of the effects on the circulation, as well as of the chemical effects of aëro-therapeutics, I will simply say that the former are the same as in normal respiration, only altered in proportion to the extent of condensation of the air, and the mechanical force brought into play by it; and the latter by the quantity of oxygen absorbed, which will produce a more active state of nutrition. These are effects apart from those caused by the action of the remedy, with which the air may be charged. From what precedes, it is easy to see that this method has a large range of application, in the treatment of the various diseases of the lungs.

Out of the whole number of cases (about 60) treated by me with this method, I had written the history of 36, which I at first intended to read as an appendix to this paper; but this being already lengthy, I am unable to do so. Twenty, however, of the 36 cases were, with description of apparatus used, &c., published in the *Australasian Medical Gazette* for November 1887. The remarks that follow are based chiefly on the clinical results obtained in these 36 cases, which are thus divided:—

Asthma	4
Acute bronchitis	3
Chronic bronchitis	4
Premonitory and first stage of phthisis ...	10
Chronic phthisis	9
Acute phthisis	1
Chronic pharyngo-laryngitis	2
Chronic Rhinorrhœa	1
Acute exudative pleurisy	1
Pleuritis adhesiva chronica	1
	36

Of the four cases of asthma recorded, one did not tolerate the mechanical treatment, the other three received the most marked benefit from it. Case No. 5 found relief from all the painful symptoms of dyspnœa only by the use of compressed air, the usual remedies having failed to do so. In this, as well as in case No. 31, the inspiration of compressed air was directed against the mechanical processes arising out of the occlusion of the bronchi, and the asthma was cut short by forcing air behind the stenosed parts of the lungs, and thus renewing the

arrested exchange of gases, and preventing the inflation of the air cells by preventing the rarefaction of the air within them. No. 29 had been a martyr to the disease for nearly ten years, and it is needless to state that all known remedies had been used by him. Before the treatment was commenced, the approach of a storm, a change in the weather, would have invariably brought on an attack. After dinner he would be obliged to sit quiet for a couple of hours, was unable to carry on his ministerial duties, and was unable to walk any distance, &c. After the treatment had been continued for a few days, he showed signs of improvement, and now he can go out in any weather, conduct two services in one day, go about his business, and, but for an occasional approach of an attack, he would consider himself quite cured. In this case, rarefied air was not tolerated, though there was slight emphysema. In this case, the compressed air was medicated with menthol, 1 in 60 of alcohol; in the other two, with ol. pini silv.

Of the effects of aëro-therapeutics in bronchitis, my experience confirms the statement reported in my first paper, viz., that all cases could be easily cured by this method; that the moderate expansion of the lungs relieves the constriction complained of in this disease, and expectoration is soon rendered easy without the aid of those disgusting compounds known as cough mixtures, about which (expectorants) no less an authority than Prof. Aust. Flint writes ("Flint's Practice of Medicine," p. 221):—"They are of doubtful efficacy, and if not useful, are less or more harmful. Squills, ipecac, syrups and opiates belong to the relics of bygone days." The effects obtained in case No. 28 were surprising. He was almost cyanotic when he first came to my rooms, the cough was simply distressing, and he was almost exhausted from want of sleep and food. He improved rapidly, and was able to leave town after a fortnight, feeling "as he had never done for the last ten years." The chief benefit to be derived by the systematic treatment of bronchitis with this method is, the expansion of the partially collapsed cells, generally left by the disease, the collapse leading to subsequent attacks, and often becoming the advanced agent of phthisis.

Against which last-named disease, aëro-therapeutics is the most potent agent which we possess. It is hardly necessary for me here to state, that consumption (laryngeal or pulmonary) in all its stages, is curable, this proposition being now beyond the argumentative stage. In the *British Medical Journal* for November 17th last, Sir Morell Mackenzie writes:—"I, who have also been of opinion that laryngeal phthisis was in point of fact incurable, must now admit that the possibility of cure, even in unfavourable cases, has been fully established." If tubercle is curable in the larynx, why should it not be when in the lungs, the lesion being in both cases the effect of the same virus, *i.e.*, tubercle bacilli? Antiseptics are the therapeutic agents that cure laryngeal tuberculosis, antiseptics must be the chief remedies that eventually will be found to cure the other manifestations of the bacilli tuberculosis on the respiratory organs. I do not believe in being an enthusiast in matters relating to therapeutic investigations, yet I cannot approve of an exaggerated scepticism, as it will only lead to nihilism. Let the idea become prevalent that phthisis is incurable, and nobody will ever think of excogitating a means to relieve the unhappy sufferers from this fell disease.

Naturally, the treatment for consumption of the lungs cannot be so efficient as that for tubercle of the larynx, as we are unable, in the former, to avail ourselves, with antiseptics, of surgical operations in removing the *causa morbi*. This effect we may obtain in phthisis by means that will destroy the germs of the disease directly, and by others that will do so indirectly—that is to say, by antiseptics, and by raising the general standard of nutrition, and otherwise rendering the lung tissues sterile, or unfit for the proliferation of the said germs; or strong, to isolate those parts already destroyed, and render them innocuous to the adjoining tissues. Aëro-therapeutics is the only means, in the present state of our knowledge, by which we can carry out the above principles of treatment most efficiently.

It is certainly the best substitute for the climatic treatment; in fact, I do believe that this will prove curative only when the density of the air is so changed as to induce the effects above mentioned in the respiratory organs. Permit me to very briefly relate the following history of a case, which bears on this point:—E. F., 29, ironmonger, with history of consumption in his family, and with short cough, loss of weight, energy, and strength, consulted me in 1886. Had sub-crepitant râles anteriorly and posteriorly over left apex. The ordinary treatment was ordered, *with change of residence to the country*. There were no means of increasing his weight (10 st.), or making a marked improvement in his condition. On April 16th, 1888, he was ordered to take two hours' exercise daily in this wise—viz., by ascending a hill slowly, keeping his right arm compressed against the same side of his chest, making deep and regular inspirations, &c. The only medicine given was troch. acid carbol. six to ten a day, a liberal use of milk, and some rum. On November 18, 1888, his weight had increased to eleven stone, and no physical signs were left. Now, to my mind, the only agent that brought about this change was the forced expansion of the left apex, and the other physiological effects of the forced inspirations.

We have not found yet an antiseptic agent which will destroy the bacilli, and cure the organic lesions caused by them, as quinine does for intermittent fever, and its sequelæ. But we certainly possess antiseptics that prove of great advantage, and the pneumatic apparatus is the most efficient means for carrying these disinfectants into the lungs. And here let me say that medicinal substances, in any form whatever, can be brought into contact with the mucous membrane of every part of the respiratory organs, by blending them with the inspired air, when proper precautions are taken. I must refer you, however, to the special works on this subject.

In all the cases treated by me by this method, the expectoration, no matter how offensive, lost its bad smell after a few days' treatment. The pus and muco-pus would disappear next, the expectorated matter becoming purely mucous. With the disappearance of these symptoms, I have constantly found a great improvement, even in the most hopeless cases, of all the symptoms that accompany this stage of the disease, especially the shortness of breath and the excessive perspiration.

It is true that several times I have administered atropine from the beginning, but I am now convinced that even without this drug, by clearing out the lungs, the perspiration disappears. Case 27 is an instance in point. I gave him $\frac{1}{75}$ of a grain of atropine occasionally;

but one evening, having had the pills prepared by a new chemist, after taking his usual pill, alarming symptoms of atropia poisoning set in. He took no more atropia; the perspiration returned a few days afterwards, but gradually disappeared with the disappearance of the other symptoms. Nos. 24–30 never took atropine, and the perspiration disappeared. But we not only carry by this means antiseptic air into every alveolus, and so carry out, as far as possible, the etiological treatment, but also by it we indirectly destroy the bacilli, by placing the lung tissue in the best condition for arresting their devastation, even in an advanced stage of the disease.

In the earlier stages (in the premonitory and first stage), my practice convinces me that consumption can be arrested, viz., the physical signs indicative of the phthisical process are brought to a standstill. The weight of the body increases, the respiratory capacity augments, the slight cough, the disturbed sleep, the careworn face, the want of energy (amounting to lassitude on slight exertion), all disappear, and do not return, so far as my experience enables me to state, even after 14 or 16 months. It can be said that the general remedial agents employed by me may account for a good deal of the improvement; but I doubt it greatly, and for two reasons—First, that many, if not all, the patients have been under the usual treatment previous to combining it with aëro-therapeutics, without the slightest benefit. Second, that of late I prescribe hardly any medicine, except some simple one, as a mild purgative, or the like. I take only great pains in directing the patient's diet.

Even in cases where temporary relief only was possible, it has been a substantial one, life having been continued for many months in comparative comfort, when there seemed nothing but the release of death left at the time they commenced treatment.

I have now only a few remarks to make about the use of compressed air while hæmoptysis is present. I have used it in all cases of moderate severity—that is to say, whenever patients expectorated some blood mixed with phlegm, or pure, in mouthfuls. I only adopt the precaution of using moderate pressure at first, and few cylinders, the blood always disappearing after a few days.

In my cases, you will find that I have used aëro-therapeutics in many more diseases of the respiratory organs, even in a case of chronic rhinorrhœa, in which it was employed with a view of relieving the large bronchial tubes from their share in the affection, but it succeeded in stopping the secretion from the nasal superficies of glairy mucus which, previous to the treatment, amounted to about two or three tumblerfuls per day, but was soon reduced to one-third, the bronchial symptoms disappearing altogether. The air was medicated with menthol solution, 1–40.

ON THE IMMEDIATE TREATMENT OF PLEURISY WITH EFFUSION.

By S. Dougan Bird, M.D.

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The subject of this short paper is limited to one phase of the treatment of one morbid state. It is this—Given a patient, otherwise normal, suffering from that very common disorder, sudden inflammatory effusion into a pleural cavity, is it not only possible and permissible, but the soundest and best practice, to *cure* him at once, *cito, tuto et jucunde*, by drawing off the fluid, instead of waiting for Nature to remove it by the tedious and somewhat uncertain process of absorption? I contend that it is, and have so done for the last twenty-five years, with the result that I have never had to regret early tapping, but several times have bitterly regretted being over-persuaded to delay it.

It is hardly necessary to refer to the history of thoracentesis, which the older writers, and indeed, some of more recent times, looked upon with holy horror, as a last resource, somewhat on the same platform as craniotomy, or the Cæsarian section in midwifery. Let us come down to our own times. We may search all the special treatises and all the dictionaries of medicine in all languages, and we will find nothing about the immediate treatment of pleurisy with effusion, but only blisters, iodine, mercury, strapping, even that refinement of cruelty, the "thirst cure," and so on, for several pages, while the unlucky patient is losing time, money, flesh, and faith in his doctor; and it is not till the next chapter, when losing all patience, he may be supposed, like a woman in labour, to be begging for "something to be done," that the question of this simple little procedure is entertained at all!

But some may say, We now know that pleurisy is not the fatal disease which our venesective ancestors supposed it to be; therefore, why interfere, when doubtless a large proportion of cases undergo natural recovery? True; not immediately fatal, but left to itself, or medically treated, it is often a prolific parent of evil. How often do we see hopelessly collapsed lungs tied down by old adhesions, which would have been prevented by early interference? How many phthisicals, who can trace back their illness to expectantly treated pleurisy with effusion, which not only kept their lower lobe squeezed and useless till it was hopelessly impermeable to air, but lowered their general vitality so much by confinement and starvation, that the ever-ready bacillus pounced on them as congenial homes? Such cases are not so common now as they were twenty years ago, for obvious reasons; but they are by no means rare, especially in new arrivals from Europe in search of health.

To my mind, the early drawing off of pleuritic effusion, to save the patient from after ill effects, is as sound treatment as the early division of stricture in strangulated hernia, instead of waiting till the gut is on the verge of gangrene; or the immediate reduction of a dislocation, instead of waiting till the head of the bone has contracted adhesions in its new position. In each of these three morbid states, we have important organs displaced by sudden and unnatural conditions, which are liable to do them permanent injury. Surely then, if these

conditions can be removed by simple and harmless means, as in our present subject, the sooner this is done the better; as the duration of the illness is reduced from weeks or months to days, the consequences of prolonged pressure are avoided; and last, not least, the chances of the degeneration of the fluid into pus are reduced to a minimum. If the object of sound medical and surgical treatment be to assist Nature towards natural cure, surely immediate tapping with a small trocar (provided that meddlesome and dangerous apparatus, the aspirator, is not superadded) exactly does so in these cases, and does it quickly, safely, and with no more pain than that of a pinch or the prick of a pin.

By immediate tapping, I mean rather so in comparison with the old plan of unnecessary and even blameful delay. We do not often have a chance of seeing a case of pleurisy from its very inception; but there can be no doubt that when the acute pain ceases suddenly with the friction sound, this is directly caused by effusion separating the inflamed surfaces. So far, so good. If this effusion were always limited to a layer of fluid just sufficient to prevent friction, it would, no doubt, be rapidly absorbed, and is so in many cases that never seek medical advice. But in a considerable percentage this does not happen, and the effusion goes on.

However heretical it may seem to philosophers of the Paley school, it is no uncommon thing for Nature's salutary processes not to stop when they have done their work, but to go on blindly, so to speak, till they push the original disease into the background, and become themselves the leading feature in the case. This we often see in hæmoptysis, which, trying to relieve a gorged lung to the extent of a few ounces, overdoes the matter to the extent of a few pints, and leaves the patient bloodless, and at death's door. So again, in the critical discharges from the great emunctories, at the turning-point of fevers and acute inflammations, when the highest skill of the physician is called for to decide whether he shall interfere, or hold his hand and stand by as a spectator.

So, in our present subject. If absorption rapidly takes place after pain ceases, and the rested and blandly-cushioned surfaces of serous membrane have had time to recover themselves, leave well alone by all means; but if by examination we find that the fluid is either stationary or increasing, the time for interference has come. It is delay, and not action, that is dangerous, and tapping should be resorted to at once. I have not found that pyrexia need be a bar to this; in fact, the temperature often falls on removal of the fluid.

The next thing we have to consider, is the method of operating. To begin with, any suction apparatus is not only useless, but harmful, and its use is as foolish and unscientific as it would be for an engineer to erect complicated and expensive pumping gear for the draining of a mountain loch into the valley below, when he need only cut a channel or tunnel, and use the natural fall. Besides, the aspirator acts too rapidly and forcibly, and gives the lung no time to expand, and has been known even to burst it, and cause pneumothorax.

A tolerably fine trochar should be used, as the patient lies on his side on the bed, or sofa, and on withdrawal of the stylet, a yard or so of small-sized elastic tubing, armed with a nozzle, is at once fitted into the canula. A natural syphon is thus formed, the fluid running into a vessel on the floor. No air can enter, and the elaborate precautions of

Bowditch are quite uncalled for. The pleura *gradually* drains as the lung expands, and probably an hour or two will elapse before the flow ceases. In these early tappings, flakes of lymph, to obstruct the tube, are rarely or never met with.

If the little operation be done in this way, hurry, and any efforts to forcibly assist the flow being, of all things, avoided, it is perfectly free from danger, and the chances of recurrence or purulent degeneration are very small indeed. Perfect rest on the affected side should be enjoined afterwards, but I have not found strapping the chest do any particular good. Treated in this way, an uncomplicated case, in an otherwise healthy person, is usually perfectly well in four, or at the outside, five days, as I have proved in a vast number of cases. Of course, it must be borne in mind that we do not always see the patient from the first. If the effusion has existed some time, a different phase is entered on, with which this paper does not deal.

A couple of cases particularly obtrude themselves on my memory as illustrative of the advantages of such treatment. Some years ago a well known acrobat and contortionist came to me. He had caught cold on board ship shortly before, and his left pleura was full of fluid, with heart displacement and great dyspnœa. I sent him at once to his hotel and tapped him as described, keeping him in bed on his side for four days. He performed wonderful feats and antics in the evening of the fourth day, and during the week, when he left for a tour in the other colonies, expressing himself perfectly well. In six weeks he came to me again, having got chilled while waiting for the mail steamer on the pier at Adelaide. The *right* pleura was now distended with fluid. Same treatment, same result. I examined him before he left for America, and could discover no morbid signs. Another case was a young tradesman just married, most anxious to fulfil a building contract, but unable to work from dyspnœa and palpitation, caused by recent pleurisy with effusion. Tapped on Friday, at work on Monday. I examined him about a month afterwards, and found nothing abnormal in his chest, and general health perfect. We all know what would have happened if these cases had been treated medically and expectantly, or if tapping had been delayed till pyrexia had ceased—*probably*, but not certainly, *recovery in a few weeks*, with the risk of many untoward sequelæ, and a depressed state of general health from confinement, low diet, lowering medicines, and worry at the loss of time and money.

THE NERVOUS SUBSTRATUM OF INFLUENZA.

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In the *Australian Medical Journal* for October 1885 is an account, by the writer of the present paper, containing such information as was then procurable, upon the great epidemic of influenza which had visited Australasia during that year, and which was locally known amongst

our public as "fog fever." It was therein shown that influenza had reappeared, after many years of comparative absence, in a severe and widely epidemic form; that, beginning in May, it reached its acme in August, prevailed over a large portion of Australasia, attacking a very large percentage of the population in Victoria at any rate, and apparently singling out those individuals who were daily much in the open air. A comparison of the features of the epidemic with the excellent description of that in 1847, given by Peacock, in "Quain's Dictionary of Medicine," showed how closely our epidemic followed the three main types therein differentiated, viz., simple influenza, influenza with pulmonary complications, and influenza with gastro-intestinal complications; whilst the existence of an apparently new feature—the occurrence of cases with well-marked cardiac symptoms—was commented upon, particulars of which are given in the record referred to.

The present paper is in continuance of the investigation then originated, and aims at the explanation of the disease upon the basis of some specific virus depressing the pneumogastric and sympathetic nerves. The recurrence of the epidemic, the nature of external cause, and other points interesting from a differential diagnosis point of view, are also incidentally touched upon as they have come into prominence, and been disclosed during this enquiry.

1. The Recurrence of the Epidemic.

Observation has shown, that a disease with the same general characters as that already described, has returned each autumn and winter since 1885, and has been specially well marked during this late winter. In my own practice, both hospital and private, a very large proportion of my cases, from June until lately, have been distinctly influenzal in type. Anomalous cases, also, which seem explicable upon no other hypothesis than that which is here advanced, have not been uncommon.

2. Causation.

Little fresh light has been thrown upon the *causa causans.* The late winter was as dry, as that of 1885 was wet and foggy—hence, the "fog" element, then insisted upon, is found, as elsewhere, to be non-essential. Variations of temperature, and of wind, however, have seemed very frequently to have had great influence in producing relapses, if not in originating fresh cases. Again, from the mode of infection, the rapid onset, the wide range, the repeated relapses following atmospheric changes, the effect of change of air upon the course of disease, as well as from the practically constant presence of a naso-pharyngeal catarrh, it seems certain that the poison attacks the system through the medium of the air —though whether the *materies morbi* be a specific microbe, or a peculiar atmospheric condition, remains problematic as ever. But, whichever it be, the incubation stage generally seems to have been extremely short. From some cases noted, in which prior infection seemed very unlikely, less than twenty-four hours elapsed. Throughout, relapses were the almost invariable rule. Lastly, the course of disease suggests the operation of a long-continued series of depressants.

3. The Substratum Attacked.

This paper is largely written to express the writer's conviction that the *causa causans* produces its results almost, if not entirely, through the medium of the nervous system; that, in fact, the symptomatology of influenza rests upon a nervous substratum; that all its clinical phenomena may be explained upon such an hypothesis, and that no other hypothesis explains them to the same extent. Taking it for granted that the medium of attack is the atmosphere, the point of impact is necessarily the naso-pharynx, radiating upwards to the frontal sinuses and middle ear, and downwards along both gastro-intestinal and pulmonary mucous membranes. What, then, is the nervous supply of the naso-pharynx, and what are the results which physiology and pathology show us, to follow from severe repeated depression of the nerves ending therein?

These may be arranged in the following table:—

Nerve Supply.	Functions.	Result of Depression—Severe and Continued.
Endings of cervical sympathetic.	Trophic and secretory changes in the mucous membranes and associated glands; vaso-motor influences to the body in general, and head and neck in particular.	Aggravated, intractable, naso-pharyngeal catarrh, with considerable secretion, severe frontal headache, local injection of membranes, with possible ulceration and sloughing; and swellings of glands; profuse sweating of head and neck, or body generally.
Endings of pneumogastric.	Accelerator of heart rhythm. Inhibitory nerve of heart; chief afferent nerve to heat centre, respiratory centre, and vaso-motor centre; sensory nerve to stomach and œsophagus.	Heart's action irregular, extremely rapid, intermittence, syncope. Chills, flushes, and pyrexial attacks of every degree, with unaccountable alterations in temperature, now very high, now sub-normal; dysphonia, disturbed respiration up to Cheyne-Stokes' respiration, sweating anorexia, epigastric pains.
The pneumogastric reflexly.	Motor nerve to pharynx, larynx, œsophagus, stomach, and partly to intestine; trophic nerve of the lungs; co-ordination of functions of organic life; connections with other cranial nerves, cerebrum and cerebellum.	Cough, vomiting, constipation, disturbed bowels; pneumonic processes, tending to phthisis; marked general prostration, both mental and bodily; delirium, insomnia, vertigo, neuralgic attacks of the fifth nerve, and pains, especially in the neck.

Such, then, are the possibilities which might be predicated from a series of depressants, acting upon the sympathetic and pneumogastric nerves in the naso-pharynx.

The glosso-pharyngeal is so bound up with the pneumogastric, that the two in this locality are practically inseparable. The only symptom added by its implication would be disorder of taste, and this was almost constantly present. Further, in addition to the local and reflex symptoms, the catarrhal condition might extend by direct continuity into both lungs and intestines.

Now, to compare these with clinical phenomena actually observed. Naso-pharyngeal catarrh of an inveterate character, and with the usual symptoms characteristic of an influenzal origin, has been found to prevail extensively under the following main aspects. Numerous illustrations might be adduced, and are procurable, but it has been thought unnecessary to introduce them here :—

(*a*) Simple recurrent naso-pharyngeal catarrh, attended with transient depression, and sometimes with transient rise in temperature.

(*b*) Such catarrh, with sudden pyrexial attacks of varying severity, attended with great exhaustion, profuse sweating, and even rapid emaciation, with the usual concomitants of pyrexia added.

In a large number of cases other symptoms were present, in addition to those just mentioned. Thus :

(*c*) In those wherein the respiratory system was vulnerable or invaded—Bronchitic, broncho-pneumonic, and pleuro-pneumonic attacks, associated with (*b*), and characterised by running very abnormal courses.

(*d*) In the hepatic.—" Rheumatic " pains, profuse sweating, continued fever, abdominal disturbances ; often phenomenal prostration ; the cases simulating now acute rheumatism, now typhoid fever, or leading to severe congestion of the liver, or aggravated renal irritation, but with the local throat lesion, &c., in addition.

(*e*) Where the heart was vulnerable.—Extremely rapid pulse, often intermittent, with cardiac dyspnœa and syncopal attacks.

In long-continued cases, which were generally of class (*c*) or (*d*), phthisis or tuberculosis supervened in many instances.

More exceptional cases have been those in which middle ear mischief followed pharyngeal sloughing (3) ; where Cheyne-Stokes respiration and marked cardiac alterations occurred (1); wherein it was almost impossible to distinguish from typhoid fever (3); wherein acute diabetes was re-established (1); and wherein malnutrition of the bowel occurred, to the extent of sloughing of the intestinal mucous membrane (2).

A comparison of these clinical pictures, with the table of results which should follow the continued depression of the vagus and cervical sympathetic will make apparent a very close agreement. The writer has been driven to the conclusion that the symptoms, noted under the class name of Influenza, are thus explicable, both in their diversity and in their totality, upon this hypothesis, and, it appears to him, upon this hypothesis alone.

4. Features of Interest from a Clinical Point of View.

This investigation has also disclosed some features of great interest :—

(*a*) The nature of the throat affection.—Quite a number of cases have been sent into the hospital as cases of diphtheria, which careful examination has led the writer to regard as influenzal. The differential diagnosis is discussed in some remarks in the Throat Section of the Congress in the discussion upon Diphtheria. The difference is maintained

to be essential, even though the virus of diphtheria seems to attack the same nerves in a somewhat similar way.

(*b*) The gastro-intestinal form of influenza, confused with typhoid fever.—So far as the writer is aware, one outcome of this enquiry has been the discovery of a form of continued fever amongst ourselves, which is mistakable for, and has been mistaken for, typhoid fever, whilst really influenzal in origin. The differential diagnosis between the two is entered into in the general discussion upon Typhoid Fever at the present Congress.

(*c*) Another very important point elucidated has been the great number of cases of more or less acute phthisis, and even of acute tuberculosis, which have dated their origin to attacks of influenza, a result readily explicable, when we remember the extreme prostration and the pulmonic complications of the disease, and the great influence which the pneumogastric exerts over the nutrition of the lungs and of the body generally.

(*d*) Lastly, the cardiac status produced by influenza in cases of heart weakness, is apparently a new point in symptomatology, and one of considerable importance. To the cases already adduced in the previous paper, others could be added. Only one extreme case, however, will be here given :—

Mrs. C., æt. 25, married, one healthy child ; father died of heart disease ; self and mother both hepatic ; patient always neurotic, often hysterical ; several times anæmic ; suffered from typhoid fever with bronchitis thirteen years ago ; no syphilis, rheumatism, scarlet fever or chorea ; six years ago suffered from cardiac irregularity, the result, apparently, of dyspepsia and tea-drinking. Since marriage has worried very much. In 1885 had influenza, and a nasal catarrh each winter since. About May last a fresh attack, with cardiac irregularity ; pulse uncountable, but no œdema anywhere, though generally prostrate. Child born in August ; relapse soon after, with cardiac dyspnœa, swelling of feet, and all the appearance of serious heart disease ; twice seen by two medical men of standing, and told that she could not possibly live. When the writer saw her, seven weeks ago, she had orthopnœa, œdema of feet and legs, paroxysms of Cheyne-Stokes respiration, with slight temperature, great weakness, anæmia, sweating, and marked post-nasal catarrh. The lungs were sound, the pulse 160, and the first sound accompanied by a bruit. After very careful examination, the opinion was given that anæmia, great excitement (patient, believing she was dying, had said "good-bye" to over twenty friends on the previous day), and influenza, would account for all her symptoms, and a less grave prognosis was gradually advanced. At present, with heart still beating rapidly, and a bruit accompanying the first sound, patient eats well, sleeps lying down, breathes naturally, takes gentle exercise daily without any œdema, is convalescing rapidly, and requires to follow only the ordinary cautions necessary in cases of vulnerable heart.

[Six months have elapsed since the foregoing was written, and during that time diphtheria, influenza, and typhoid have been epidemic. This extended experience has remarkably verified the conclusions here advanced. The case mentioned above has required no treatment for four months.]

ON WANT OF PROPORTION IN THE SIGNS AND SYMPTOMS OF DISEASES OF THE HEART AND GREAT VESSELS.

By James Jamieson, M.D.

Lecturer on Medicine at the Melbourne University, and Physician to the Alfred Hospital.

It is an oft-repeated, and perhaps rather trite observation, that in the knowledge, and even the ability to make good use of the modern refinements in physical diagnosis, there may not be an unmixed gain. There is certainly a tendency—pardonable perhaps, but still erroneous—to lay undue stress on them, to the extent of reckoning that when we have inspected and palpated, percussed and auscultated the chest, we have done almost all that is really essential for diagnosis, and for the treatment based on it. Most of us, perhaps, need to be reminded of the truths so strongly insisted on by Dr. Stokes, in the preface to his work on "Diseases of the Chest":—"It cannot be too often repeated that physical signs only reveal mechanical conditions, which may proceed from the most different causes; and that the latter are to be determined by a process of reasoning on their connection and succession, on their relation to time, *and their association with symptoms.* It is in this that the medical mind is seen. Without this power, I have no hesitation in saying that it would be safer to wholly neglect the physical signs, and to trust in practice to symptoms alone." Even with all our improvements in physical diagnosis—and these have been considerable, even since Dr. Stokes published his great work—this is still good doctrine, though it may be good doctrine pushed to its extreme consequences. For, doubtless, there may also be error in allowing the conclusions based on symptoms to override those derived from a consideration of physical signs.

It is with the view of illustrating and emphasising the truth, so well stated in the first part of the quotation just given, that I have thought it worth narrating the following cases, which have come under my observation at the Alfred Hospital. They are intended to show the benefit to be derived from using all available helps in diagnosis; and to indicate, further, how great is the difficulty which may be experienced in arriving at correct conclusions about the extent and severity of organic disease of the heart and great vessels, and how one may be led astray to regard that severity as greater or less than it really is.

The first case was that of a man, T. D., a sailor, aged 50, admitted to the Alfred Hospital on 16th August, 1888. He stated that, till a month before admission, he had been well, and able to do a full day's work at full current wages. When working in water, he caught cold, getting a dry cough, and suffering from dyspnœa, with some swelling of the belly. A week after, the legs began to swell, though this swelling for a time disappeared, and the dyspnœa was not marked, when he had been lying down. Two or three times he coughed up a little bright red frothy blood. Had scurvy eleven years before, but had never suffered from rheumatism. All his people had been healthy, as he had been himself.

On admission, the legs and belly were much swollen, and there was slight œdema of the chest-wall. He had a markedly cyanosed look about the face, and he suffered so much from dyspnœa, that he was unable to lie down. The superficial veins of the neck were distended, the prominence being most marked on the right side. He had a troublesome short cough, but no expectoration.

Examination of the lungs revealed nothing more than harsh breath sounds anteriorly; but at both bases, posteriorly, there was slight dulness with crepitation, but no increase of vocal resonance.

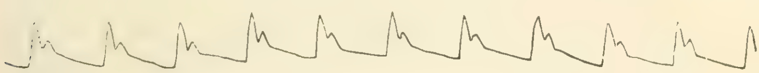
The examination of the heart showed that the apex beat was displaced downward, and to the left; and a double blowing sound was heard there, and was transmitted to the left. Over the tricuspid area, there was heard a loud systolic murmur; and the second pulmonary sound was accentuated, and had quite a ringing character. The aortic sounds were not altered in character. The pulse was 100, regular, but compressible.

It appeared, therefore, that we had to do with a case of mitral disease, the signs being those of obstruction and incompetence combined. It was further evident, from the sounds heard at the right apex and base, that there was tricuspid incompetence; this being also made plain by the swollen condition of the veins of the neck, and the marked cyanosis.

The treatment consisted in the use of the hospital stimulating mixture, with m. xv. of tincture of digitalis. Under this he improved for a time; but when he became worse again, both Tinct. of strophanthus and this same mixture were tried, without any appreciable good effect.

On the 20th, he was found to be in some respects much improved, the dropsical symptoms having disappeared, but he was not yet able to lie down on account of the dyspnœa, and the veins of the neck were still distended. The murmurs described had not altered. Pulse tracings were taken on this day for the first time, with Dudgeon's sphygmograph, with the condition here shown :—

Perhaps this did not show more than that the heart was supplying a small amount of blood to the arteries at each systole; but, at least, it seemed to give some confirmation of the supposed state of things at the mitral orifice. From this time there was continuous improvement in the general condition, the breathing becoming much easier, and cyanosis to a great extent disappearing. There was evidence of improvement, also, in the following pulse tracing, taken on the 28th :—



But on the 30th, the whole aspect of the case was found to have changed for the worse. He was taken with increased difficulty of breathing; the cyanotic condition of the face again became fully apparent, and he was seized with fits of coughing, when he spat up blood, not much mixed with mucus. From this time, the course was steadily downward; the cough with bloody expectoration continuing, and pain

in the chest, with pleuritic rubbing, helping to make it evident that there was pulmonary embolism, with infarct formation, going on. The breathing for some days had the Cheyne-Stokes character, and this enabled us to make an interesting observation. Pain was complained of on the left side, at the base of the heart; and, when respiration was deep, there was a distinct friction sound, synchronous with the chest movements; but when respiration almost ceased for a short period, the rubbing sound was synchronous with the cardiac contractions.

Death occurred on September 12th. On post-mortem examination, both sides of the heart contained clots, which in the auricles had in part an ante-mortem character. The left ventricle was dilated and hypertrophied, the only distinctly morbid condition at the mitral orifice being, that one of the valves was slightly shortened, so that closure was not perfect. There was no constriction of the opening, and careful examination revealed nothing more than a slight roughness on the surface of the valves, which, but for the fact of a murmur having been heard, accompanying the auricular systole, might readily have been overlooked. The right ventricle was dilated, and the tricuspid opening rather enlarged. There was an increase in the amount of pericardial fluid, but no roughness of the surfaces. There was, however, fibrinous deposit, causing roughness of the pleural surfaces at the base of the heart, its situation accounting for the fact that the heart was capable, by its movement, of causing the friction sound, synchronous with its contractions and easily heard when respiration temporarily ceased. Both lungs contained several infarcts, and both showed some consolidation at the bases; the kidneys were slightly granular; the liver was congested, and showed indications of the nutmeg condition.

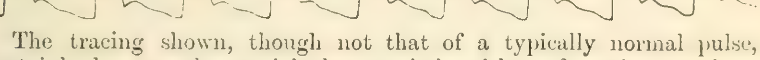
This case had several points of interest about it. It was not easily apparent, how such severe cardiac symptoms should have come about so suddenly in a man previously healthy; and it can hardly be said that the post-mortem examination helped much toward a clearer explanation. Till careful investigation was made, it did not appear that there was any disease of the mitral valves at all; and there was certainly nothing in their state, incompatible with the continuance of life for some years, with at least fair health. Up to August 29th, indeed, he seemed to be in a fair way of recovery, the supervention of severe symptoms then being due to the pulmonary embolism. It might even be suspected that the strengthened action of the heart, which led to such general improvement, had the counterbalancing disadvantage, that more vigorous contraction favoured the detachment of clots, which had been deposited in the right heart, at the time when it was much dilated and weak. It may safely be said that the mode of production of such severe heart symptoms was unusual. In some chronic lung conditions, and notably in emphysema, it is well known that the right ventricle becomes hypertrophied, with consecutive dilatation and incompetence, followed by venous stagnation and dropsy. Could the same state of things have come about here quickly, as the result of some acute obstruction to the circulation through the lungs? If we assume the occurrence of tricuspid incompetence, with consequent stagnation in the systemic venous system, we can understand further that the increased work thrown on the left ventricle, by this stagnation working backward into the arteries, caused the slight mitral affection to acquire importance. In this way the

vicious circle would be made complete, though in an order the reverse of that most frequently observed.

The second case was, in some respects, the counterpart of that just related. The patient, S.D., a butcher, aged 38, was admitted to the hospital on 18th July, 1888, having previously attended as an out-patient. He stated that he had had an attack of rheumatism six years previously, and had suffered from slight shortness of breathing ever after. On the whole, he had enjoyed good health, and followed his occupation till November 1887, when, after lifting carcases of sheep, he felt an aching pain in the left side. Since that time, he had suffered more or less from pain of a throbbing or aching character. He was not aware of having strained himself, and certainly had no symptoms of an acute nature. For the previous three months he had been worse, the pain extending to the left groin and the loin, and being sufficient to make his sleep broken. There had never been swelling of the feet, or any distinct pulmonary symptoms.

On examination, the first thing remarked was the distinctness of the apex beat, seen and felt in the fourth or fifth intercostal space, according as the chest was in inspiration or expiration. As he lay in bed, his breathing was quiet and regular, and no abnormality of the lungs could be detected. Auscultation revealed a slight systolic sound at the apex, not communicated to the left. There was a double bruit, heard loudest to the right of the sternum, over the aortic orifice, but transmitted rather widely to the base of the heart, toward the right clavicle, and down the whole length of the sternum. The diastolic murmur was very loud and long drawn. In the epigastrium, and as far down as the umbilicus, there was a faint systolic sound heard. On examining the chest posteriorly, there was found a spot on the left side, between the eleventh and twelfth ribs, where there was tenderness on pressure, and distinct heaving pulsation. At the seat of pulsation, there was heard a faint bruit, about equal in intensity, and similar in character, to that noticed just above the umbilicus. There was no abnormal pulsation to be felt in the corresponding part of the lumbar region anteriorly, though it had been distinctly noticed in that situation when he was first seen in the out-patient room by Dr. Maudsley. He had then, and previously, complained of pain and throbbing, extending from the margin of the ribs to the groin, on the left side. After admission, not only had this pulsation entirely disappeared, but it was easy to define the abdominal aorta, to all appearance normal on palpation, along the greater part of its course.

The supposition was, that he had double aortic mischief, the character and localisation of the murmurs pointing distinctly to that defect, but it was not at all clear what was the cause of pulsation in the lumbar region. Sphygmographic tracings were taken, for the purpose of getting whatever light might thus be obtainable, and they were found to be the same on both sides.



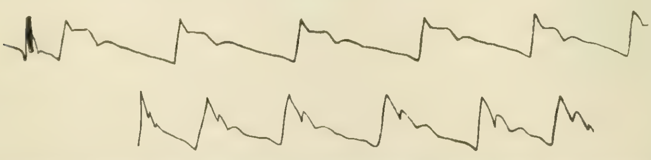
The tracing shown, though not that of a typically normal pulse, certainly has not the special characteristics either of aortic stenosis or regurgitation. It has not the sloping rise and rounded top of the first,

and just as little does it exhibit the sudden and deep fall of the other. In so far, therefore, as the sphygmographic indication went, it was only in taking away any marked significance from the murmurs heard over the aortic area. Some roughness there probably was at the aortic entrance, causing the systolic murmur, and the loud and long diastolic bruit could hardly be accounted for on any other supposition than that of reflux from the aorta into the ventricle. But if such regurgitation there was, it certainly must have been small in amount, and going on through a very small opening. That the disturbance of the blood current in either direction, in the neighbourhood of the heart, was slight, was also shown by the fact that the man steadily improved under the influence of rest, losing the pain he first complained of, and never experiencing difficulty of breathing; in fact, he expressed his ability and willingness to go to work again. There was still little appreciable change in the murmurs described, or in the pulsation in the loin. On the 7th August however, there was slight pulsation noticed for the first time, in the second intercostal space, close to the right sternal border. This became more marked, and was easily distinguished on the 18th, just before he was discharged at his own request, promising to return and report himself.

This case was a very interesting one, the physical signs being so obtrusive, and the general symptoms comparatively slight. The most probable supposition, perhaps, is that there had been effusion of blood into the sheath of the descending aorta, without much, if any, injury to the proper aortic wall, so that recovery by absorption was possible. But, independently of this assumed accidental condition, it seems certain that there existed dilatation of the aorta, which was undergoing slow but progressive development, and was making itself more apparent at last, by pulsation to the right of the sternum.

After this was written, the man presented himself again for examination on 20th December, four months after his discharge. He had been losing weight, but had continued at work, and declined re-admission. The murmurs heard about the aortic area were not much altered, but the pulsation on the right side was more distinct, being easily seen and felt in the second intercostal space, and less so in the third, about an inch and a half from the sternum. The pulsation in the left loin was just the same, but the blowing sound seemed to be rather louder, and also heard further up along the left side of the spine.

Pulse tracings were again taken, right and left radials being found similar. Those here given are from the left radial, the first taken in the recumbent, the second in the sitting posture, and it cannot be said that they give any assistance in diagnosing the exact nature of the severe condition undoubtedly present.



A third case may be shortly narrated, in which, with very marked implication of the heart and great vessels, there was relatively but a

slight amount of general disturbance. The patient, F. G., aged 54, by occupation a hodcarrier, was admitted to the hospital on 8th October, 1888. He stated that he had always been well, and fit for hard work, till six months previously, when, having got drunk, he lay in wet clothes all night. Soon after, he was seized with a severe cough, which was harsh in character, though not attended with pain. His voice also became hoarse, so that for a time he could scarcely make himself understood. Gradually, his breathing became rather difficult on exertion, though it was all right so long as he was quiet. He had never been troubled with giddiness, and for some time he had slept well. Just about the time of admission, he had begun to feel shooting pains in the left shoulder, and a feeling of weight in the epigastrium. A week previous to admission, he spat up a small quantity of blood.

On admission, it was noticed that his voice was harsh in tone, and that he had a loud brassy cough ; but nothing abnormal was discovered about the vocal cords. Inspection of the chest revealed very marked deviations from the normal condition. The upper part of the left side was covered with large veins, some crossing the sternum to the right. There was also a swollen condition of the veins of the left upper arm. The supra-clavicular space was also more filled out on the left than on the right. As he lay in bed, there was no sign of cardiac impulse to be seen or felt in the usual situation, but there was marked pulsation, resembling a good deal that of the cardiac apex, to be seen and felt in the second intercostal space on the right side, about two inches from the sternum. To the touch, it was a sharp stroke, re-duplicated in character. When he stood up, a centre of pulsation could be made out on the left side, behind the cartilages of the ribs, on a level with the tip of the ensiform cartilage ; but even then there was no distinct apex-beat to be felt anywhere. On percussion, there was dulness on the right side, down to the level of the third rib, and on the left to the upper border of the fourth rib. The cardiac sounds could only be faintly heard on the left side when he lay quiet, but became louder and more distinct when he stood up ; and were heard best low down, behind the combined costal cartilages. They were heard most loudly over the seat of pulsation on the right side, when he was lying, and even when he stood up, they were at least as loud as over what corresponded with the cardiac area. In neither situation were the sounds accompanied or displaced by a bruit. The only thing that could be called a murmur was heard, and that only occasionally and faintly, behind the cartilage of the sixth rib on the right side. Posteriorly, there was nothing abnormal discovered on the right side, except unusual distinctness of the heart sounds ; but on the left, there was dulness on percussion, down almost to the angle of the scapula, and there, as in the infra-clavicular region in front, the breath and voice-sounds were faint. The case had very striking features, therefore. There was evidently a tumour, occupying or compressing the upper lobe of the left lung, and pressing on the left subclavian vein. The heart was considerably displaced, and at first, indeed, it almost seemed as if it had in some way got pushed completely up beneath the right clavicle, both pulsation and cardiac sounds being so distinct there. That idea could not be held, however, for there was no unusual dulness behind the middle of the sternum, and it was impossible to understand how any tumour, in the upper part of the left thorax, could have pushed

the heart up beneath the right clavicle with its apex still downwards. It was also made apparent, in time, that the heart had been actually pushed down, so that its pulsations were hidden behind the conjoined cartilages. It had further to be assumed that the pulsation on the right side was caused by the aorta, though it was difficult to account for its position, so far to the right and high up, when the heart was at the same time driven down. Of course an aneurismal dilatation of the ascending aorta might extend far to the right; but the pulsation was very distinct and sharp, and not at all a distensile heave. And besides, there was not the dulness on percussion behind the sternum, which might have been expected in the case of a large aneurism of the first part of the aorta; and there was no blowing sound to be heard at or near the seat of pulsation. Sphygmographic tracings of both radial pulses were taken, and were found to be similar in character; and as will be seen, not much help was got from this source, the curves not differing materially from those commonly enough got in healthy persons.

In spite, too, of the marked local signs, the man was not long in the hospital before he began to say that he had no pain; that he ate and slept well; and was fit to undertake a light job, which he knew he could get. He certainly exhibited very little in the way of distress, or any general illness, and was at last allowed to go out, with the request that he would report himself in a short time, and at least return if he became worse.

It may be regarded as certain that there was some dilatation of the aorta in its first part, though the pulsation was a distinct double beat, and some of the most characteristic signs of aneurism were lacking. This was confirmed by the fact that, a few days before he was discharged, it was noticed that there was a little bulging of the second intercostal space, and of the third rib, even though the pulsation remained the same in character, and no bruit could be heard at its seat.

The only attempt at active treatment consisted in the introduction of an exploring needle at the second left intercostal space, in the hope that the tumour might be of hydatid nature. The needle was introduced to the depth of two inches, entering easily, but no fluid was got, not even blood. The result was, therefore, purely negative.

A CASE OF CEREBELLAR DISEASE, IN WHICH AN EXPLORATORY TREPHINING AND REMOVAL OF DISEASED BRAIN SUBSTANCE WAS FOLLOWED BY GOOD RESULTS.

By Henry Maudsley, M.D.

The surgical treatment of intracranial tumours, and other conditions of the brain which are diagnosed, not by any deformity of the skull, nor by any history of injury, but by the symptoms general and focal they give rise to, being still in its infancy, it is our duty to report all such cases, whether successful or not. Only in that way is progress likely to be made, and it is to be borne in mind that the reports of unsuccessful as well as successful cases are likely to advance our knowledge. This must be my apology for reading before such an assembly an account of a single case.

On January 9th, 1888, I saw, with Dr. Davenport, H. C., a gentleman 30 years of age. He gave us the following history:—

He had never been out of Australia, had travelled much in the bush, and had enjoyed good health until the onset of the present illness. There was no history of syphilis, of head injury, or of disease of the middle ear. He had been temperate in all things. There was no history of tubercle, of cancer, or of tumour of any kind in his family.

In September 1886 (sixteen months before I saw him), he began to suffer from headache. The headache was severe, more or less constant, but paroxysmally worse. It was referred to occipital region, and radiated towards the vertex. Since that date his headache has continued, occasionally a week elapsing without pain; latterly, the paroxysmal pain has become worse.

In December 1886 (three months after the onset), he began to suffer from attacks of vomiting, independent of any errors of diet. The attacks would last one to three days, and rarely a week elapsed without an attack. During the attacks, the pain in the head was "agonising." These attacks have not diminished in frequency or severity, but, on the contrary, have increased.

In July 1887, he began to suffer from giddiness, and his gait became affected. He staggered like a drunken man, and had a tendency to fall forwards and to the left.

In August 1887, dimness of vision came on first in the left eye, and in the course of a month he became completely blind, being unable to see the brightest light. Before the onset of blindness, he would occasionally see double. Deafness in the left ear came on about the same time, and seemed to have a gradual onset.

Since September 1887, he has had some difficulty in walking, independent of his blindness, the left arm and leg being awkward in their movements. Since the same date there has been asymmetry of the face. There is no history of convulsions, or of loss of consciousness.

On January 9th, his condition was as follows:—He is a tall, stout man, complaining of headache, vomiting, blindness, and deafness on the left side. On testing his cranial nerves, we find a complete

absence of the sense of smell, complete blindness, and deafness on the left side. There is slight paresis in all the muscles (the upper and lower groups), supplied by the facial nerve. There is no affection of the ocular muscles or of those of mastication. The pupils are unequal, the right widely dilated, the left of medium size. Neither pupil reacts to light; the left reacts in accommodation, the right is sluggish. There is no nystagmus.

Examination of the fundus oculi reveals a white filled-in disc, the arteries are small, and obscured by white inflammatory deposits. There are numerous white patches around the margin, suggestive of old hæmorrhages. The appearances are indicative of white atrophy, consecutive to neuritis, and the blindness is no doubt due to this cause. The non-reaction of the pupils to light, their reaction on convergence of the eyeballs, is further evidence of this atrophy being the cause of the blindness. There is no actual motor paralysis of the limbs, but the movements of the left hand arm and leg are more awkward than natural. When supported by two persons, he has a distinct tendency to fall to the left. There is no typical hemiplegic gait. He complains of some numbness and tingling in both hands, but there is no loss of sensibility to touch, pain, or temperature. The superficial reflexes are normal. With regard to the deep reflexes, the knee-jerk is obtained with difficulty on the right side; on the left, its presence is doubtful. Ankle clonus is not present on either side. His bladder and rectal reflexes are normal, and his sexual condition is normal. He suffers from constipation.

Examination of the skull reveals nothing abnormal. His heart, lungs, liver and spleen are normal. There is no sign of hydatid, no evidence of syphilis, old or recent, and no evidence of ear mischief. The urine is free from sugar or albumen.

Such being the condition of the patient, with such a previous history, there was very little doubt that he was suffering from organic brain disease, and little more doubt that the disease was either an intracranial tumour in its widest sense, or an abscess of the brain. The exact nature of the tumour, its size, and its position, were not so clear. With regard to the position, the slow onset of the disease, the general symptoms having existed a year before any focal symptoms appeared, the character of his gait, the probable simultaneous occurrence of left facial paresis with deafness on the left side, the diminution of the knee-jerk on the right side, and its doubtful presence on the left, seemed to point distinctly to some lesion involving the left auditory and left facial, where these are in contiguity, and to some affection of the left lobe of the cerebellum. An absence of any distinct paralysis, motor or sensory; an absence of any convulsions, the position of the headache, and the severity of the vomiting, also favoured the view of the lesion being in the cerebellum. Deafness occurring alone, is of little value in localising a lesion, for hæmorrhage into the nerve or its nucleus, or into the end organ, is not unfrequently a cause of sudden deafness; but deafness on the same side as a facial palsy, and not dependent on disease of the middle ear, points strongly to one lesion involving both nerves near their entrance into the internal auditory foramen.

That the lesion causing the deafness in the left ear, was not in the right temporo-sphenoidal lobe, in the perceptive centre for hearing, may

be dismissed, as in lesion of one temporo-sphenoidal lobe the deafness is only temporary, the same being the case in experimental lesions in the monkey. From these considerations, one lesion in the left lobe of the cerebellum, about the amygdala, causing pressure on the neighbouring left facial and left auditory, seemed highly probable.

With regard to the pathological diagnosis, abscess may be dismissed at once, as there was no ear mischief, and never had been any, and no history of a blow, and there was an absence of fever.

Syphilis and tubercle may be dismissed, as he had been treated by mercury and iodide of potassium some months before, by Dr. Springthorpe. There was no evidence of tubercle elsewhere in the body, and no family history.

The diagnosis seemed to lie between hydatid and a sarcoma or glioma of the cerebellum, or some tumour growing from the temporal bone, about the internal auditory foramen, and pressing on the cerebellum. Against its being a hydatid, was the absence of any signs of hydatids in other organs, and the site (cerebellum or base of the skull) is not one favoured by hydatids, the majority occurring within the cranium being in the cerebral hemispheres. Dr. Thomas' valuable paper, at the last meeting of the Congress, showed that out of 97 cases of intra-cranial hydatids, in 11 there were hydatids elsewhere, chiefly (5 of them) in the liver, and of these 97, only 4 were in the cerebellum, so that the chances of this being a hydatid were not very great.

The pathological diagnosis, then, remained doubtful. The patient and friends, having heard of the successful cases of brain surgery, were in hopes that something might be done. However, when they were told that any operation would be an exploratory one—that the result of it was very doubtful; that the two cases of attempts to remove a cerebellar tumour had ended fatally; that if the tumour were safely removed his eyesight would not return—the friends were unwilling to have any operation. During the next three months, the patient made no improvement. His headache became worse, and his attacks of vomiting were more frequent, the patient and his friends were now anxious that an exploratory operation should be performed.

On April 8th, I saw the patient with Mr. FitzGerald. The symptoms were the same as in January, except that he had gradually become deaf on the right side. Mr. FitzGerald agreed with me, that there was probably a tumour in the left lobe of the cerebellum, and that consecutive to this was a distension of the ventricles, from inflammatory thickening of the meninges about the base. He considered an exploratory operation quite justifiable. The deafness on the right side somewhat complicated the case; upon the whole, I was of opinion that it was caused by neuritis of the right auditory nerve. Dr. Springthorpe, who had seen the patient before any localising symptoms appeared, saw him, and was present at the operation. He was of opinion that there might be a tumour in the left lobe of the cerebellum. Dr. Davenport, who had watched the case for some time, concurred in the diagnosis.

On April 20th, the head having been shaved and the scalp washed with æther, and kept in a carbolic towel for twenty-four hours, Mr. FitzGerald made an incision from the occipital protuberance outwards along the left superior curved line, and another downwards from a point midway between mastoid and the protuberance at right angles to

the first, and reflected the soft parts. He then trephined below the line of the lateral sinus. The bone was thin; on removal, the dura mater bulged above the level of the opening, and presented a cyst-like appearance. On introducing a needle, no fluid escaped. The dura mater was incised. The cerebellum bulged out, and was so soft that a quantity ran away. There was no pulsation. A needle introduced in a direction towards the petrous portion of the temporal, brought away no fluid. Mr. FitzGerald introduced his finger, and found the brain substance very soft, and came on what seemed to him to be a solid nodular growth fixed to temporal bone, under the tent in proximity to the temporal bone. The brain substance was decidedly softer than normal cerebellar substance. It was decided not to proceed further. Mr. Fitzgerald then, having seen advantage in a previous case from tapping the ventricles in a case of hydrocephalus, trephined over the temporo-occipital region of the skull with a small trephine, and passed a small hollow needle in the direction of the ventricle. No fluid escaped. The bone was at once replaced, and the wound stitched. The flaps over the cerebellar wound were stitched, and a drainage tube introduced. The wounds were dressed with salicylic wool.

Dr. Davenport gave the chloroform, after having administered ¼ grain of morphia hypodermically. There was very little bleeding from the brain substance. The patient did not suffer so much from shock; his temperature was normal; his pulse about 100. The pupils contracted under the influence of morphia.

The trephine wound over the vault healed by first intention, the bone adhering at once. Within three weeks, the occipital wound was reduced to a superficial granulating sore.

The patient convalesced rapidly. When he woke up from the chloroform, his old pain had left him. On the third or fourth day, he had noises in the right ear, and by the seventh he could hear sounds; by the fourteenth, he could hear words spoken slowly in a loud voice; and by the end of the month, he could listen to his nurse reading the morning paper. He had subjective flashes of light, but he was quite blind.

Since the operation, there has been no return of the pain, no attack of vomiting, and his gait is now that of a blind man, there being no tendency to fall to the right. He is deaf on the left side, partially on the right, and he is quite blind, the optic discs being in a condition of white atrophy. He eats and sleeps well, but at times he is much depressed, owing to his blindness.

What the exact lesion was, remains doubtful. Was the left lobe of the cerebellum the seat of a soft glioma? Or is there a tumour in connection with the temporal bone or the tent, which has ceased to grow since the operation?

The extreme bulging of the cerebellum into the opening, and the softened condition of the cerebellar tissue, seem to make it probable that the left lobe of the cerebellum was the seat of a soft glioma. Unfortunately, none of the brain substance which came away was examined under the microscope.

Note on July 12, 1889.—The patient still continues in good health. There has been no return of the headache or of the attacks of vomiting. He is deaf on the left side, and his sense of hearing is deficient on the

right; but he can converse with his friends, and can hear when spoken to. He is completely blind. Evidently there is no recurrence of any growth, so that the probability of there having been a glioma in the cerebellum is not great.

CEREBELLAR DISEASE.

Dr. Verco related a case he has seen in consultation, in which there were diffuse, distant symptoms pointing to possible existence of cerebellar disease, but not sufficient to justify operative interference. A short time afterwards the patient came into the hospital, and died in about two days with typhoid symptoms. On autopsy, there was found a cyst on the under surface of the cerebellum, about its centre, but hollowing out one lobe. It apparently originated in the pia-mater, had no limiting membrane, and no hydatid cyst. The substance of the cerebellum was somewhat softened. In this case, had operation been undertaken, the cyst might have easily been opened, and recovery resulted. This suggests that Dr. Maudsley's case might have been such a sub-cerebellar cyst, with some degenerative softening of the left cerebellar lobe. On operation, the lobe might have presented, and the finger have been passed into and through the softened organ, and into the simple cyst, the contents of which might have been allowed to flow out without notice. Gliomata are, as a rule, soft, non-encapsuled infiltrating growths, and it is somewhat difficult to understand so complete a removal of them by simple breaking down with the finger, as to prevent recurrence.

A CASE OF INJURY TO THE FRONTAL REGION OF THE BRAIN.

By D. Colquhoun, M.D. Lond., M.R.C.P. Lond.

On August 5th, 1887, I was called to see Mr. H. A. B., aged 24 years, who was suffering from violent epileptic fits. When I saw him he was unconscious, and breathing heavily, but there were no signs of paralysis. He had for the next four days very few periods of remission, fit following fit in rapid succession. On the 7th of August, there was a brief interval of consciousness, lasting for an hour or so, in which he recognised those about him. This was followed by severe fits. On the 8th August, he became comatose between the fits, urine and fæces escaped into the bed, cystitis set in, and on 9th August he died.

The fits came on in a manner common to many cases of epilepsy. He gave a sudden cry, the head became extended, and violent general convulsions came on. The right hand and arm, however, seemed to me

to have little intrinsic movement, but to be moved mainly by the general tremor of the trunk. I made an examination of the body next day. In physical structure there was nothing noteworthy. The body was small, but normal. In the centre of the forehead, near the anterior limit of the hair, an elevation about as big as a horse bean could be felt. It was smooth and hard, and felt like callus. On removing the scalp, this was found to be a bony growth at the seat of an old fracture. In the right temple there was an opening into the skull, covered in by dense fibrous tissue. On removing the calvarium, this aperture was seen to be the beginning of an old fracture, which led to the centre of the frontal bone. There, corresponding to the external boss, was a flattened and ragged pistol bullet, embedded firmly in the inner table. The brain and dura mater were here so firmly attached to the skull, that they had to be removed in part with the calvarium. The veins on the surface of the brain were distended with blood, and the lateral ventricles contained excess of fluid.

Dr. Scott, Professor of Anatomy at Otago University, who kindly examined the brain, gave the following account of it:—

"The bullet seems to have first come in contact with the brain at the posterior end of the lowest horizontal frontal convolution of the right side. The entire length of this convolution was degenerated, and adherent to the skull; indeed, came away with the skull-cap when it was removed. The external convolution, on the orbital face of the frontal lobe, was also in the same condition. The anterior half of the middle horizontal convolution, and the anterior third of the superior, were likewise destroyed and adherent. The bullet finally lodged against the superior frontal convolution of the left side, which was indented and narrowed."

As I had been informed that the wound was originally inflicted in Exeter, I wrote to the hospital there, and Dr. A. G. Blomfield, Physician to the Exeter Dispensary, very kindly obtained the following details for me. He wrote as follows:—"The case was not under treatment in the Exeter Hospital, but at the Torbay. Dr. Braufoot, who was House Surgeon there at the time, writes me as follows:—'I recollect very well the case of poor Mr. B., and some interesting points were published in the *British Medical Journal*, probably in August 1883. The lad was brought in from Daddy Hole Plain with a bullet wound in the right temple. The bullet had evidently impinged near the mid-line on the inner surface, smashing the cranial bones; and there was a discussion at the time as to the bullet being felt beneath the integument in one of the crevices. The lad was stupid and dazed on admission, and somewhat collapsed, but in three or four hours answered queries as to name, address and profession of his father, and a few details about the deed, and his reasons for the last. Subsequently, he had pyrexia and symptoms of inflammatory reaction in the cranium, and became gradually more and more stupid, but in ten days' time all fever subsided, his mental faculties began to re-awaken, and he made an uninterrupted recovery. He was soon tired by attention to books, or reading for a long time, and occasionally became excited and emotional. When admitted, no local palsy of any kind was discovered, but subsequently he lost power in the left hand and arm, and the lower part of the left side of the face was paralysed as far as volitional

movement went, but for ordinary purposes of expression, of motion, and eating, his facial and mouth muscles seemed to act normally. As far as I recollect, this weakness of the side of the face and limb developed subsequently, or coincidently with the inflammatory reaction of the wound in the head. When seen at the Exeter Assize, though his look was unsteady and wild, and he gave one the idea of want of steady attention, yet he talked of the future (viz., that he was going to study medicine in Edinburgh) quite rationally, and he expressed his gratitude for what had been done. There was no other paralysis but the one mentioned.'" Dr. Blomfield adds that he had been unable to discover if the patient had been epileptic before the attempt to commit suicide, or his mental condition before that. I have not been able to find the case reported in the *Journal*, so that I can only speak of his mental state as I had been able to observe it since he came to New Zealand. He called on me soon after he arrived in New Zealand, about three years ago. He had made a proposal for life assurance, and told me, in the course of my inquiries, that he had tried to commit suicide, and that a pistol bullet was lying somewhere in his brain. He also informed me that he was subject to attacks of epilepsy, but I cannot recollect if these attacks had come on before the attempted suicide, or afterwards. I advised him not to go on with the proposal for insuring his life, and he immediately agreed, asking me not to mention what he had told me, as he was anxious that his antecedents should not be known in the colony. Afterwards, I found he had made similar confidences to nearly all his acquaintances. I saw him occasionally during the next three years, but never professionally until during his last illness, but he spoke freely about his attacks. Fits occurred seldom, but when they came on they were very severe. On one occasion I met him in the street, and he told me "he had, he thought, beaten the record, having had about 300 fits in two days." He fell into the hands of an American advertising quack early in 1887, who promised to cure him, and received a relatively high fee from him. A somewhat long interval of freedom from fits was followed by the last fatal attack. He had spent a year or so in studying medicine at Edinburgh, and was intelligently interested in medical matters. A few weeks before his death, he spoke to my surgical colleague, Dr. Brown, about the advisability of submitting to the operation of trephining, for the removal of the bullet. Dr. Brown approved of the operation, but Mr. B. did not again present himself. In business he was not very successful. He entered one of the banks as a junior clerk, and remained there for a few months. He was apparently not fit for sustained work, and was very forgetful. He tried several kinds of work, and finally bought a small business, in which he lost the little capital he had possessed at starting. He was not without shrewdness in money matters, but was easily moved, by anyone who was in his company, to do extravagant and foolish things. His tastes were in many ways elevated and refined. He was fond of music, poetry and pictures. He was, on the other hand, intensely erotic, and quite unable to restrain his passions. At one time he was weeping and praying about his sins, and attending a Ritualist Church, and in a few weeks he had become a sceptic, and was cynical about human virtue. He was liable to gusts of fury, often set up by mere trifles. These would pass off as quickly

as they had come on, and he would then apologise humbly for what he had said or done. He was, on the whole, kindly and well disposed. He was emphatically a creature of impulse, but his impulse, as a rule, was towards good; but if it happened to be towards evil, he had no power to check it by any restraint of will. The case is mainly interesting as a contribution towards the localisation of the cerebral functions. In connection with it, I may cite a case reported by Dr. S. K. Towle, and quoted in the fifth volume of "Pepper's System of Medicine."

Dr. Towle says:—"The man had been a lieutenant in a volunteer regiment, and I gave him rather more privileges (in the Soldier's Home at Milwaukee) on that account; but after a time I found that he was more nearly an example of total depravity than I had ever seen. There was no truth in him, and he was intelligent enough to make his lies often seem plausible to me, as well as to others. By his writing and talking, and conduct generally, he kept the patients and their friends in a ferment, and gave me more trouble than the whole hospital besides. He had a small scar about the middle of the forehead, which he said was due to a slight flesh wound from a glancing ball in battle. While he was under my care, an older brother came to see him, and he told me that, up to the time his brother (my patient) entered the army, he was almost a model young man—amiable and affectionate, the pet of the whole family and intimate friends; but, said he, ever since he came back he has been possessed of a devil if ever anyone has. In a few months he quite suddenly died. In sawing open the skull, at the point of the small scar on his forehead, the saw came directly upon the butt end of a conical bullet, two-thirds of which projected through the skull, piercing the membranes, and into the brain. The internal table of the skull had been considerably splintered by the ball, the pieces not being entirely separated, and there was evidence of severe chronic inflammation all around, and quite a collection of pus in the brain where the ball projected into. Here was the devil that possessed the poor fellow."

Dr. Towle does not indicate precisely the anatomical lesions in this case, but it was the injury done, as in the case reported above, in the frontal convolutions of the cerebrum, in the part assigned by Ferrier and others, to the organs of the moral and intellectual faculties. I am not aware of many recorded cases of moral insanity due to definite ascertained lesions of the cerebrum, but I have little doubt that in both these patients, their erratic moral course was directly due to the destruction or irritation of certain definite regions in the brain, the functions of which exact investigation has yet to determine.

A SERIES OF CASES ILLUSTRATING LOCALISATION IN NERVOUS DISEASES.

By J. W. Springthorpe, M.A., M.D. Melb., M.R.C.P. Lond.

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The following series of cases is brought forward as typical of many interesting features of nerve diseases, as a record of careful work in the department of neurology, and as further evidence of the degree to which localisation may be carried in such department. Age and etiology are also noted, since they are frequently inseparably connected with the nature of the lesion, but questions of prognosis and treatment are untouched, as being likely to complicate what is intended to be kept simple.

Cases 1 and 2 illustrate some of the finer points in the localisation of spinal lesions. It was thought unnecessary to include cases illustrating the ordinary diseases of the text-books. Lesions in the internal capsule are then illustrated, both of the right capsule and of the left; both of rupture and of occlusion; both of the lenticulo-striate and lenticulo-optic arteries, and of both combined. In all these, the symptoms and causation may be said to present their typical features. A case is added (Case 7) in which a cortical branch of the middle cerebral artery may have been the seat of the occlusion.

Coming to the cortex itself, cases are recorded of probable implication of the arm centre, and of certain injury to the leg centres, as well as of lesions, irritative and otherwise, of the ascending frontal and parietal convolutions, and of the lateral and inferior regions of the cortex. Cases 20 and 21 are also presented as illustrating weakness of the brain area as a whole.

Some typical brain tumours are also described and localised—one of the pons, one of the fourth ventricle, and two of the cerebellum. In the first three, a post-mortem examination disclosed the nature and site of the lesion; in the fourth an operation was performed, which gave relief from some pressure symptoms. In all, the details showing the advance of the tumour, the fresh symptoms produced, and the time required to produce them, may be accepted as strictly accurate.

Lastly, two cases are presented, in which localisation was diagnosed as probable, once by myself, once by others. In the former, peripheral irritation, ovarian in origin, in a person with a local brain instability, was found to be the actual cause; in the latter, operation showed the case to be one of chronic hydrocephalus and not hydatid cyst of the left frontal lobe.

Appended are the Tables of Cases:—

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
1.	Male.	—	Railway Accident—a blunt fragment of wood striking him on the right side.	After the injury, walked home; complained of girdle pain round lower waist, with tenderness of right side of upper sacral and lower lumbar vertebræ, weak from the knee down. Pains in leg, especially the instep, stiffness of the part; no reflex to tickling within a week. Weak in the following movements—flexing the leg on the thigh, raising the os calcis, walking, moving the ankle laterally and up and down; could not move the foot or flex the big toe. Gradually improved. In three weeks, sensation normal, but foot dragged, and big toe not properly flexed.	Contusion of the spine implicating the exit of the fifth lumbar, and first and second sacral nerves of the right side.	The interferences with sensation and motion as found by myself, and the site of the injury, as verified upon the patient, exactly correspond with the experimental results obtained by Ferrier. Thus, the ilio-psoas, adductors sartorius, the extensor femoris, and peronei, which are regulated by the third and fourth lumbar nerves, were unaffected.
2.	Male.	20	Unknown.	Suddenly pain and stiffness in right calf, and in right side generally. Fourteen days pyrexia, with profuse unpleasant sweating, then pains bi lateral and confined to the arms. Paresis and paralysis followed, with atrophy; both fairly symmetrical. Two months later, slight wasting in right calf and thigh. Flexion still weak. Forearms semi-flexed, semi-prone; fingers extended and abducted. Cannot extend the elbow, flex the fingers, or rotate the wrist. Shoulder movable, but cannot touch the occiput. Electricity detected wasting in the pectorales, latissimus dorsi and triceps, in the flexor muscles of the forearm, the thumb and interossei, posteriorly, with little or none in the radial aspect and supinator longus. Later on, the flexor and thumb muscles, the interossei, the abductor minimi digiti especially wasted, with local coldness, lividity, and denuded aspect, but flexion, rotation, abduction, &c., returning. Some slight atrophy remaining in right leg.	Poliomyelitis anterior acuta, commencing in the right lower lumbar and first sacral regions, implicating mainly, bi-laterally, the anterior zones between the sixth cervical and the first dorsal.	Ferrier found that the fourth and fifth cervical were the motor spinal roots for the Deltoid, Romboids, spinati, biceps, brachialis anticus, supinator, longus, the extensor and serrate muscles; none of these were appreciably affected. The sixth presides over movement and nutrition in the latissimus dorsi pectorales, triceps and pronators. The seventh over some of these, the teres, subscapularis and hand flexors. The eighth over the flexors of wrist, fingers, and hand, the extensor of the wrist and triceps. And the first dorsal over the thenar, hypothenar, and interosseal muscles. Most, if not exactly all of these were found affected. Patient had been treated for acute rheumatism for the first five weeks.
3.	Male.	46	Rupture of small tense artery three months ago.	Right hemiplegia. No unconsciousness, headache, or dizziness. Leg affected more than arm, bluer, colder, but no hemi-anæthesia. Still, increased knee jerk, ankle clonus, leg dragged; arm almost normal. No deviation of mouth or tongue on attack, though speech thick for two months, and whistling impossible.	Small branch of left lenticulo-optic artery	The arm and face fibres of the internal capsule probably implicated simply by pressure, the rupture being behind the knee of the capsule.

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
4.	Female.	55	Rheumatic embolism at age of 20.	Thirty years ago sudden right hemiplegia, without unconsciousness. Arm and leg paralysed for four months, with hemi anaesthesia. Face and tongue unaffected. Now, motion in arm perfect, but leg distinctly colder, bluer, and less useful than its fellow. There is always a limp, and various dysæsthesiæ. The knee jerk is markedly increased.	Embolism of lenticulo-optic artery.	Differing from Case 3 in *cause* and *extent* of injury.
5.	Female.	24	Embolism from mitral disease.	Sudden right hemiplegia 10 months ago, face, arm and leg all affected, with unconsciousness, but no hemi-anaesthesia. Aphasia for 11 weeks. Walked after some time. Now, speech good, arm cold, denuded of epidermis, but not permanently contracted. Leg drags somewhat. Reflexes on right side increased, but no ankle clonus.	Left lenticulo-striate artery blocked.	The full force of the deprivation of blood fell upon the arm fibres, in the anterior segment of the internal capsule.
6.	Female.	50	Rupture of vessel 12 months ago.	Left hemiplegia, with antecedent pain and giddiness. No unconsciousness or aphasia. Face and tongue not affected. Foot improved before the hand. Hand now in state of contracture. Patella reflex increased, but fair movement retained.	Small vessel in the knee of the right capsule.	Illustrating the localised effects of a rupture, and the non-implication of speech in left hemiplegia.
7.	Female.	36	Syphilis 5 years ago.	Twelve months ago sudden right hemiplegia, aphasic for a few hours. Face and leg paretic for a few days, but *arm* quite useless and weak ever since.	Probably syphilitic destruction of the branch of middle cerebral artery to ascending frontal convolution.	Possibly the site was lenticulo-striate.
8.	Male.	49	Vascular degeneration.	Sudden attack of right hemiplegia, attended with unconsciousness for 36 hours, and complete aphasia. No hemi-anaesthesia. Apparently blind in the right eye. Within six weeks, could raise the leg well, but no power at all in the hand and arm. On the 60th day, delirium and restlessness supervened. Seventeen days later patient died, with temp. 107°, pulse 156, and respirations 54.	Left lenticulo-striate artery blocked; the supplied parts in a state of white softening. In the descending horn of each ventricle was a cholesteoma the size of a small marble.	Introduced as illustrating a form of ending, where the mischief is not repaired. The post-mortem showed extreme atheroma of both aorta and cerebral vessels, with softening in the anterior portion of the left internal capsule, and connected convolutions.

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
9.	Female.	56	Either rupture of vessel or thrombosis.	Prodromata, severe headaches, giddiness, and attacks of vomiting; then right hemiplegia, only found on attempting to move Face, leg and arm all paralysed, with complete hemi-anæsthesia, which lasted for five weeks. Throughout, speech not affected. Patient and two of her children left-handed. Sensation returned in five weeks, followed by sharp, severe pains in the right side. Leg could be moved in same time; eight weeks, however, before the arm could be moved at all, and patient could walk fairly before the arm was used. Fifteen months later, practically complete recovery of arm and leg movements, but less strong and soon tired. Intellect normal. Speech perfect, but memory sometimes requiring prompting.	Involving both lenticulo-striate and lenticulo-optic arteries, or a large rupture of the former only.	Illustrating how right hemiplegia, in a person who is left-handed, is not accompanied by aphasia.
10.	Male.	60	Rupture of vessel or vessels.	Left hemiplegia, following giddiness. Hemi-anæsthesia, without unconsciousness. Leg and arm paralysed. Mouth drawn over, but speech remaining. Deafness in left ear, and slight deviation of left eye.	Ruptures involving branches of the middle cerebral artery	The fibres from the tempero-sphenoidal lobe, and probably the angular gyrus also, implicated.
11.	Male.	50	Alcoholism.	Four fits during three months, similar, but varying in severity. Aphasic aura, followed by coma for six hours. Mouth drawn over. Paresis of right arm, but not of leg. Throbbing headaches, often excruciating, confined at first to left frontal area. Intense irritability. Memory failing. Fits of despondency.	Irritative lesions of left ascending frontal and parietal convolutions radiating from the island of Reil.	Localised broadly by the headaches, as well as by the symptoms of paresis.
12.	Male.	37	Syphilis in 1864.	Twenty years after, tingling numbness up right arm to shoulder, extending to the hip, with paresis and spasms of the arm. An epileptiform convulsion, leaving arm powerless for an hour; many similar, but slighter attacks. A second convulsion six months later, with occasional slight sudden weakness, and implication of speech. Nine months ago, aphasia for 14 days, without facial distortion or implication of arm. Leg never affected, and no hemi-anæsthesia. Three months later, severe headaches, worst near the coronal suture, now nocturnal and very severe. Memory affected. Obtuse. Speech slow and deliberate.	Gumma in the lower extremity of ascending frontal convolution, ending in pressure on the dura mater, and specific meningitis.	The arm centre involved first, then the speech centre. The dysæsthesiæ which accompanied the attack supports the hypothesis that the tactile centre is situated in the neighbouring hippocampal region. Under pot. iod. and pot. brom. complete recovery established during last twelve months.

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
13.	Male.	28	Direct injury—blow from 16 lb. hammer	Eight months ago stunned, but not unconscious. Severe headaches followed, radiating from the wound, even to insomnia. In three months these ceased, and suddenly queer sensations noticed in calves. Next day both legs completely paralysed. Face and arm unaffected. Gradually improved, with pains and stiffness in neck and back muscles. Now, knee jerks increased, legs dragged, but no clonus; the toes do not stick to the ground, and there are no cramps.	Dura mater, then convolutions in mid line of vertex, just behind the fissure of Rolando, the leg centres of Ferrier.	The site perpetuated by a scar still visible in the position mentioned, forming a crucial illustration of the agreement between experimental and pathological results.
14.	Female.	46	Unknown: dates from removal of a mammary tumour.	Attacks of epilepsy, at first fortnightly, now less frequent, but more violent. Aura consisting of dull noise in right ear. Nasty taste in right mouth. "Catherine-wheel" explosions of colour in right eye. Occasionally various dysæsthesiæ, disturbances of intellect, and of special senses, without epileptic status. The usual symptoms during and after attacks. The fits more right sided than left sided.	Molecular instability of lateral and inferior regions of the left cortex.	The centre of vision is localised by Ferrier in the angular gyrus; of hearing, in the superior temporo-sphenoidal lobe; of smell, in the subiculum cornu ammonis; and of touch, in the hippo-campal region.
15.	Male.	17	Unknown. Mother died of cancer; brother in asylum; one sister asthmatic, and the other with irritable spine.	Onset sudden and only noticed forty-six days. Began with unaccountable frontal headache of great intensity, slight nausea, giddiness, and impaired sight. Signs of double optic neuritis and vomiting within a few days. In a month, slight general twitchings, repeated sighing, and epileptiform seizures, characterised mainly by general rigidity, and later on by opisthotonos, terminating in prolonged tremor and great exhaustion; finally, bed-sores, loss of control over bladder, and coma.	Tumour of the lobulus centralis of cerebellum pressing on the valve of Vieussens, right superior peduncle, nates, and testes, and descending horn of the right lateral ventricle	The tumour was of the nature of a glioma, the sudden onset of symptoms following a hæmorrhage. The site of the headache, exactly opposite to the growth, is worthy of notice.

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
16	Female.	27	Probably syphilis. Miscarriage four years ago. Child four months old said to be suffering from congenital syphilis.	Five months previously, left hemi-paresis without hemi-anæsthesia; also paresis of right arm, and severe right parietal headaches. Now, paralysis of left seventh and eighth nerves added, and marked choreiform movements of all limbs, especially the right arm, with ulceration of left soft palate. In sixteen days, diplopia and weakness of left external rectus, the headaches spreading to frontal area, and embracing the whole head; legs much weaker, especially the right. In thirty-five, spasm of masseters, and tenderness of scalp; then double optic neuritis and giddiness. In sixty-five, right hand, twenty with dynamometer, left hand nil. In eighty, restlessness, delirium, stupor, and neuro-paralytic ophthalmia of the left eye, the headaches being very severe and general. On the ninety-second day, died. Throughout, no vomiting.	Tumour the size of a small orange resting on left pons, implicating the left seventh, eighth, sixth and fifth cranial nerves in the order named.	In eight months, this tumour seems to have grown from a size simply irritating the pons to that mentioned. Its progress may be traced in the symptoms The locality of the headache, again, is noteworthy. The neuro-paralytic ophthalmia occurred only when pressure on the Casserian ganglion had become possible by the extension of the tumour.
17	Male.	22	Syphilis, small pustular rash on body, large symmetrical scars on legs. Syphilitic plaques found on liver and spleen, and a large gumma breaking down in the left kidney.	Five weeks previously, suddenly severe vomiting, incessant occipital headache, staggering gait. Now, double optic neuritis, retracting the head with rigid neck muscles, more on the left side, but disappearing within ten days. Frequent yawning, and altered heart rhythm. Within the week, deafness in right ear, and about the same time the right sixth paralysed. Three weeks later, sight affected, pupils immobile; finally, double ptosis. All were on the right side. Mind becoming gradually stupid; drowsy, unconscious, and comatose. Five weeks after admission, no polyuria or polydipsia (said to accompany lesion of pineal gland); no paralysis of facial or hypoglossal; no paralysis of limbs. Three weeks after admission, sudden localised infiltrated patch in mid upper sacrum, discharging pus from five apertures in two days; no choroidal atrophy, but opaque nerve-fibres present.	Tumour of the fourth ventricle, pressing first on the spinal accessory and vagus, spreading forwards to the right side, and pressing on the right sixth and eighth, the facial and hypoglossal nuclei, being deeper seated, escaping. The fifth somewhat implicated, also the valve of Vieussens, the third and fourth, and finally, the corpora quadrigemina. Considerable serosity of the plexus, and increase of ventricular fluid, especially on the right side.	Another case of localised lesion, in which the extension of the tumour can be traced in the symptoms as they arose.

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
18	Male.	29	Obscure. No history of syphilis; but exposure to risks of hydatid. All symptoms within eight months.	Excruciating headaches, paroxysmal, at first in the occiput, now advancing along the midline. Attacks of vertigo, at first turning to the right, now to the left (five months after the headaches). Attacks of vomiting for six months, worse on empty stomach, with extreme straining and nausea. Extreme double optic neuritis, with scores of flame coloured hæmorrhages, and appearances like albumenuric retinitis. No kidney disease detectible. The hæmorrhages appeared suddenly, with sudden loss of hearing of right ear. Right eye, vision almost gone. Latterly, speech thick at times, and gait somewhat unsteady.	Tumour, probably hydatid, in left lobe of cerebellum (?)	This case is introduced as probably illustrative of obscure brain localisation. The hæmorrhages seem to have occurred during paroxysms of vomiting. It is still under observation.

The foregoing case was written in August 1887. Patient remained under my observation till December 1887, gradually getting worse. When I saw him last, he was quite blind in both eyes, but no other localising symptoms had appeared. His subsequent history is related by Dr. Maudsley. In time, some operation seemed advisable from his general health, but there was still uncertainty as to the nature and site of the tumour. Little, if any, light was thrown upon these points by the operation itself. During digital examination through the opening through the occipital bone, some one-third of a teacupful of cerebellum came away; but as no localised tumour was felt, a second opening was made more towards the left supero antero-parietal region, also with negative results. It is to be regretted that this second attempt was not made into the right cerebellar lobe. I think we may have all erred in not locating the tumour there. The result of the operation, however, was the relief of pressure-symptoms. I make this note here, because my duties in the Sanitary Section debar me from the pleasure of hearing Dr. Maudsley's paper.

19	Female.	16	Family history good.	Somnambulism as a child. Congestive headaches instead of catamenia at monthly intervals, with nausea and vomiting till last twelve months. Twitchings of both hands for two years. Falling on knees, in all, some fifty times during the last six months. Progressive failure of sight for five months, with atrophy of each disc, and pigmentation. Mentally, memory failing and obtuse, instead of quick as previously. No epileptic attacks. No paralyses. Fulness of head in frontal region, suggestive of tumour.	Chronic hydrocephalus.	The interest of this case lies in the fact that it was taken for a case of hydatid of the left frontal lobe. Trephined, tapped, and found to be a case of chronic hydrocephalus. I examined the optic discs for the surgeon in charge of the case.
20	Male.	42	Extreme sexual excess, and syphilis at 28.	Neurasthenia and cerebrasthenia. All the usual symptoms to a marked degree. Various dysæsthesiæ. All nerve functions unstable and weak, but no true paralysis. After the syphilis, had the rash, sore throat and tongue, recurring at 38, with paralysis of right external rectus.	General nerve weakness. Syphilitic lesion in the course of the sixth nerve.	Introduced as illustrating a diffused instability, rather than any localised lesion.

Case.	Sex.	Age.	Cause.	Effects.	Site.	Remarks.
21	Male.	23	Sunstroke - -	Twelve months ago in Madras, sunstroke of average severity; no paralyses since. Memory unaffected; intellect keen, but capacity for continued attention almost nil. Feeling of oppression, more in the occiput, with eyes weak, painful, and bloodshot, on attempting steady work. Sight good; retina fairly normal. Stomach quickly upset; until the sunstroke, all the functions vigorous, but now unequal to ordinary work.	Molecular instability of the brain as a whole, with probably permanent vascular and consequential changes.	Introduced as illustrating the diffuse effects of sunstroke. Contrasting with the instability of cerebrasthenia. The site in the latter is probably primarily within the nervous system itself, and not in the vascular system.
22	Female.	34	Peripheral irritation in a person with a local brain instability.	Unbearable headaches of a bursting character, more in right parietal and frontal regions, occurring in paroxysms. Extreme distaste for food, though seldom vomiting. Hearing good, but indescribable noises almost constantly in the right ear. Symptoms of pressure upon both ophthalmic veins, with appearance of incipient neuritis in right eye. Throbbings in right jugular. Pains in right side of neck. No spasms or paralyses. A complete invalid from the head and stomach symptoms for more than eighteen months, the symptoms dating from a septicæmic attack following retained placenta three and a half years previously. There was a family history of migraine, and patient had always been subject to attacks herself.	Right ovarian and tubal disease; the ovary half fibroid, half soft and friable; the tube in a condition of well-marked hæmato-salpynx.	Introduced as illustrating a localised result from peripheral irritation. The case is a somewhat celebrated one. Many different diagnoses had been given. No uterine or associated disease having been found by skilled examiners, the writer suggested—? abscess in the right temporo-sphenoidal lobe, the result of septic infection. Eight months later, however, enlargement of the right ovary was detected, and now, twelve months after the operation, patient is practically cured.

A CASE OF RAYNAUD'S DISEASE.

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The condition which was first described, from its ultimate manifestation, as "symmetrical gangrene," and which has since, according to the stage which in any given case was most conspicuous, been variously recognised as "local syncope," "local asphyxia," "local ischæmia," "local cyanosis," will probably, and justly, take its place in nosologies under the name of Raynaud, who first collated the recorded cases, and formulated a rational theory of its pathology. As it still ranks among the rarer neuroses, a brief description of a case which occurred recently in my hospital practice, and which, through not absolutely typical, was sufficiently well-marked, may be of some interest to the members of the Congress; and I therefore proceed, without further preface, to recount its leading features.

History.

E. T., æt. 38, married fourteen years, without children, engaged as a seamstress, came under my treatment at the Melbourne Hospital in July 1888. Her health had always been good; she had had no acute illness of any kind, but had suffered from chilblains in girlhood.

Her present illness began in the winter of 1885. She first noticed that the terminal phalanges of the fingers became quite white and painful, this condition lasting at first about a quarter of an hour, and ceasing after friction or exposure to the heat of the fire. During the winter it gradually extended upwards, and affected the second phalanx; and after exposure to sharp cold, the whiteness was followed by a dark "blue-black" appearance, with severe pain. The left fore-finger was particular affected, and seems to have been treated as a whitlow, the end being poulticed and incised, but no matter came, and very little blood followed the incision. Soon after this, *the nail dropped off.*

Improvement occurred during the summer, but during the following winter (1886) the condition became worse, and *the nail* of the left middle finger was lost. The affection has been present more or less continuously ever since, and as gradually become more painful. The whiteness and deadness of the fingers occurred even during the warm weather of the summer, but was especially produced by cold.

The pain has been greater during the present winter, and most of the fingers have lately become red and swollen in the intervals between the attacks; but when the attacks come on, these red and swollen fingers become quite white, cold, numb, and much smaller in size.

Causation.

On this point, nothing definite can be ascertained, except that she had much worry and trouble before this ailment began. Hemicrania, which is sometimes associated with the disease, is not known in her family, nor is there a family history of any other neuroses. There are no menstrual irregularities, and her other organs and systems are normal,

except (1) the digestive, which is occasionally painful. The tongue is furred, and there is constipation. (2) The heart, where there is evidence of aortic obstruction, in the presence of a faint systolic murmur, loudest in the aortic area.

Local Appearances during Attack.

(1) *Stage of Ischæmia.*—Her condition last August was the following:—Her hands are always more or less painful, and usually in a state of redness and swelling. On first rising in the morning, the fingers, up to the metacarpo-phalangeal joint, become perfectly white and dead, and extremely painful. The bloodlessness of the fingers, quite symmetrical, accompanied by extreme coldness and painful anæsthesia, and sharply and abruptly marked off from the normal warmth and vascularity of the metacarpal region, was frequently seen by me, and pointed out to the students. The extreme contrast and abrupt transition from absolute cadaveric pallor to the natural glow was most striking, and totally different from the diffuse coldness and gradual transition to healthy warmth of surface so commonly seen in those with weak circulation or heart-lesions. This stage of *ischæmia* usually lasted through the forenoon, and as the day became warmer, the whiteness was replaced by a bluish-black appearance, which succeeded immediately to the maximum whiteness.

(2) *Stage of Cyanosis.*—In this stage, which was rapidly developed, and several times displayed itself while the patient was under observation in the out-patient room, the *cyanosis*, or *local asphyxia*, was extremely marked. The digits began to recover their warmth, and the whiteness was rapidly replaced by a deep indigo hue, almost passing into black. This stage was much shorter than the first (lasting usually from five to ten minutes), and appeared to owe its existence to the fact that the primary spasm, affecting both arteries and veins, disappeared first from the latter, and permitted the regurgitation into the capillaries of venous blood which had been detained for a considerable time in the smaller veins. This state was immediately succeeded by a stage of erythema, in which the fingers became red and swollen, and the pain was a little diminished.

(3) *Stage of Hyperæmia.*—Formerly, the pain ceased entirely at this stage, but now (*i.e.*, in August 1888) the right forefinger and the left little finger are permanently red and swollen.

(4) *Gangrene.*—On August 12th, I noted that "the left little finger is red, swollen, and slightly tender; there is a small cicatrix on its tip, where a black patch formed some weeks ago, and a similar appearance is extending under the nail, which threatens to separate. A similar discolouration is visible on the dorsum, on the pulp of the last phalanx, and under the nail of the right forefinger; and a slight loss of skin on the end of the right ring-finger, which was preceded by a black speck."

These losses of tissue in skin and nails were very small, but distinct enough, involving the loss of two entire nails, and of several small portions of skin.

None of the interesting nervous symptoms, such as aphasia, transient blindness or deafness, were observed in this case; nor was there detected, at any time, hæmaturia or albuminuria.

There were no cardiac symptoms. The aortic murmur was a very obscure one; and as already said, the local pallor was very different from that sometimes seen in heart-disease.

The toes were symmetrically affected, but much less severely than the fingers.

The intensity of the symptoms was always increased by cold, and as the spring advanced they have gradually abated, until now there is only a slight redness and fulness of the fingers, with scarcely any discomfort.

Treatment Practically Useless.

Treatment has been of little avail. It has been conducted on three lines :—

(1) An attempt was made to remove the vascular spasm, partly by acting directly on the arterioles by means of nitro-glycerine, partly by diminishing undue excitability of vaso-motor centres by the agency of the bromides. The former, in one minim doses of the 1 per cent. solution, produced disagreeable physiological symptoms, without the least improvement in the local disturbance, and was soon abandoned. The latter, alone or combined with belladonna or valerian, were better tolerated, but equally futile. In view of the cardiac lesion, although there were no signs of defective compensation, digitalis had a fair trial, on the theory that it might possibly overcome peripheral resistance, but its action on the arterioles rendered this in theory almost a forlorn hope ; and, in fact, it also was useless. Spirit of nitrous ether, as a vaso-dilator, was also vainly tried.

(2) The changes were rung on the various vascular, blood, and nervine tonics—chiefly iron, strychnia, and cod liver oil ; but in no case did it appear that any beneficial effect was produced.

(3) Electricity, in the form of the descending stabile current, which produces relaxation of the arterioles, has had a prolonged trial, extending over several months. The patient found that the attack was shortened slightly by this ; the ischæmia passing into the stage of erythema somewhat sooner, but no permanent good was done. The spasm returned with undiminished intensity on the following day, and the results of the electrical treatment in this case hardly bear out the conclusions of Raynaud himself as to its efficacy.

As minor details of treatment may be mentioned, the use of friction and the wearing of warm gloves, which slightly palliated the severity of the symptoms, but had no effect in preventing the recurrence of the daily paroxysm.

Remarks.

The diagnosis in this case was based upon the presence of extreme vaso-motor disturbance, characterised by three well-marked stages of ischæmia, cyanosis, and erythema (or rather hyperæmia), affecting the extremities symmetrically, excited or intensified by cold, and leading to superficial necrosis of very small portions of nail and skin. The presence of a valvular lesion of the heart, and the history of chilblains in childhood, caused at first some hesitation in diagnosis, but further observation removed any doubt as to the existence of a true vaso-motor neurosis, causing local disturbance of circulation, which could not be dependent

either on back-working, or on defective cardiac power. In the description of this disease, given by Dr. Allan Starr, in Pepper's "System of Practical Medicine" (the only complete account to be found in any systematic work), absence of cardiac disease is specified as a condition of the diagnosis, but this appears to me to be an unnecessary requirement, inasmuch as the local phenomena are sufficiently characteristic to be identified even in the presence of heart disease.

Another point of special interest in this case is the very short duration of the attacks, and their daily recurrence—all the stages of the disease being daily manifested. Pepper says that "the shortest duration of a single attack has been ten days, the longest five months." But in this case, a complete paroxysm was passed through every day, showing typically—(1) local ischæmia; (2) local cyanosis; (3) local hyperæmia, the first lasting a few hours, the second only a few minutes (not more than 15), and the third being present in a varying degree until the beginning of the next paroxysm. This daily recurrence of paroxysms was a striking feature of the case.

Nature of the Disease.—Old Theory.

Until a few years ago, there were no post-mortem records of cases; and the theory originally propounded by Raynaud, as a deduction from clinical observations, viz., that the disease is a vaso-motor neurosis, was universally accepted, the only difference of opinion being on the question whether the vaso-motor irritation was in the vaso-motor centre itself, or was excited by peripheral irritants. I find, however, in Virchow and Hirsch's *Jahresbericht* for 1888, an abstract of a paper by Dr. Goldschmidt, in *Revue de Médicine*, entitled, "Gangrene Symmetrique et Sclerodermie," in which he describes in detail a case of Raynaud's Disease, "which was complicated with the appearances of an extensive scleroderma, in a woman æt. 43, previously healthy. . . . After five years' existence of the disease, there finally appeared symptoms cardiac and renal (albuminuria). The patient died suddenly in consequence of cardiac failure (Herzinsufficienz). At the autopsy, the essential feature was a widespread endarteritis and endophlebitis terminalis, both in the gangrenous and sclerosed parts; the same could be demonstrated in the terminal arteries of the kidneys and lungs. It is noteworthy, that changes in the peripheral nerves could not be demonstrated. Brain and spinal cord were not examined. On the basis of the anatomical data, the author regards it as certainly established, that in scleroderma, and in Raynaud's disease, we have to do with the same pathological process in different phases of development—an endarteritis terminalis, with regard to which it must still remain doubtful whether it owes its origin to vaso-motor disturbances, or is of micro-parasitic source." I translate this abstract in full, because it is obvious that every post-mortem record of a rather obscure disease is of importance as a possible source of light, and I regret that I have no access to the original paper, to which reference is made for the clinical details. The new theory here put forward is totally at variance with that hitherto received, inasmuch as it takes the disease out of the category of neuroses, and places it among chronic degenerative affections of vessels. The two conditions *may* have coincided in Goldschmidt's case, for there is no incompatibility between vascular spasm and vascular inflammation. But endarteritis and

endophlebitis, *per se*, appear to me to be totally inadequate to explain the phenomena of Raynaud's Disease, for (1) its greatest frequency is between the ages of 15 and 30, when endarteritis is rare; (2) only two cases have been observed in patients as old as 50, when endarteritis is common; (3) endarteritis is a chronic condition, leading to permanent organic changes, while Raynaud's Disease consists of definite attacks, with well-defined "stages," ending in recovery, and followed in a large proportion of cases by recurrence; (4) in my case the condition was distinctly paroxysmal, and this character is also manifested by the transitory aphasia, blindness, albuminuria, hæmaturia, and glycosuria, which have been sometimes observed; (5) endarteritis would scarcely account for the precise symmetry of the local appearances, which is, on the other hand, not only consistent with, but characteristic of, a purely neurotic origin. This new theory may, therefore, I venture to think, be set aside as insufficiently supported by positive evidence, inadequate in itself, and inconsistent with clinical facts.

Reverting to the accepted theory, that the disease is a vaso-motor neurosis, the question arises whether the vaso-motor irritation originates in the centres themselves, or is reflected from the periphery. Raynaud regarded it as central, mainly on the ground that "galvanisation of the spinal cord modified the arterial spasm," and the partial benefit derived from electrical treatment in the case here reported bears in the same direction. But it would be rash to draw a positive conclusion from a single piece of evidence which is still in want of confirmation, and it appears that the good effects of galvanising the cord (assuming that they are proved) may be due, not to the removal or suspension of morbid changes in the vaso-motor centres themselves, but to a diminution of their normal excitability, rendering them insusceptible to the action of peripheral irritants.

Stronger arguments, in favour of the central seat of the primary disturbance, appear to be found in the intensity and persistence of the arterial spasm, in the occasional paroxysmal character of the attacks, and in a consideration of the alleged or suggested sources of reflex irritation. The latter are all of a very general kind. Thus, "Weiss believes that the condition may occur in response to irritation arising in the skin, in the viscera, or in the brain" (Pepper, p. 1261). But cutaneous, visceral, and cerebral irritations exist in hundreds of thousands of cases, without producing symmetrical ischæmia and gangrene, and in any case in which they do, it becomes necessary to assume the existence of some undue excitability of vaso-motor centres—in other words, to admit that the essential condition is a central one. Here, we may refer to the analogy of epilepsy, where all sorts of peripheral irritants may come into play as exciting causes of the central discharge. To this group of neuroses, including epilepsy and hemicrania, Raynaud's Disease may most reasonably be referred.

An additional item of evidence, in favour of a central change, is furnished by the title of a paper which I find in *Schmidt's Jahrbücher* for 1887 (Vol. 216, p. 310). The paper is by Marfan, and is entitled "Syncope locale des extremites superieurs à la suite d'une commotion medullaire" (*Arch Gén.* 7 S. XX., p. 485, Oct.) Here again, I have no access to the paper, and no abstract is given by Schmidt; but the title implies that the disease was consecutive to concussion of spinal centres.

The existing evidence is not yet sufficient to justify a positive conclusion, but its weight is decidedly in favour of the theory that the disease is of a central origin.

An attempt has been made to explain the symptoms of "Raynaud's Disease," as the result of peripheral neuritis. Thus, in the *British Medical Journal* for January 1887 (p. 57), Wiglesworth reports a case under the title of "Peripheral Neuritis in Raynaud's Disease (Symmetrical Gangrene)," and in the discussion on this paper at the Pathological Society, reference was made to similar observations by Bowlby, Pitres (2 cases), and Mountstein, of Strasburg. In Wiglesworth's case, advanced chronic inflammatory changes were found in all the nerve trunks of the limbs, but the clinical details of the report do not appear to justify the diagnosis of Raynaud's Disease. The case was, in fact, quite obviously one of peripheral neuritis, with epileptic dementia, in which there was great atrophy of muscles, and in which the gangrene (leading to the loss of fingers and toes) was the result, not of deprivation of blood supply, but of injury to the trophic nerves. There is no history given of vaso-motor phenomena, which are the essential feature of Raynaud's Disease; and the value of the case is further impaired by the fact, that advanced granular kidneys were also found. Peripheral neuritis is as incapable as endarteritis of accounting for the paroxysmal character of true Raynaud's Disease, and few competent judges will be disposed to accept the conclusion of Dr. Wiglesworth, that his observations "tend to take Raynaud's Disease out of the category of neuroses, by giving it a tangible material lesion to rest upon." The obvious error in this case has arisen from the condition of "symmetrical gangrene" having been identified with the lesion described by Raynaud, and regarded as its essential phenomenon. As a matter of fact, symmetrical gangrene is no necessary result of the vaso-motor disturbance which constitutes the disease, and is much more likely to be caused by trophic nerve lesions, either central, or as in Wiglesworth's case, peripheral. It is desirable to emphasise the fact, that symmetrical gangrene is a secondary result of various primary lesions, and that it does not, *per se*, form a disease type. It would also be well if the lesion now under consideration could receive a single descriptive name, based on its pathological cause or chief clinical features. If I were to describe my own case in this way, I should call it "paroxysmal recurrent ischæmia;" but this name would probably be inadequate in many cases, and as the clinical phenomena are variable, and the essential pathological cause is still obscure, it seems advisable still to retain the convenient title of "Raynaud's Disease."

Addendum.

Since the foregoing paper was read, I have just received the *British Medical Journal* for December 8th, 1888, containing a paper by Dr. Affleck, on Two Cases of Raynaud's Disease. For one of these the left foot had to be amputated, and the internal plantar nerve was found to "have suffered extensively from neuritis, and was undergoing degenerative change, many of the bundles being entirely destroyed, and replaced by fatty matter." The author remarks that, "it might, perhaps, be urged that this was a secondary result to the tissues of the affected parts, from the changes in them accompanying the gangrene;" and considering

that in this case the gangrene was extensive, involving the anterior half of the foot, so that "it was evident that every tissue in this part had perished," and considering that this condition had existed for nearly two months before amputation, it seems more reasonable to regard the degeneration of the nerve as a consequence, than as a cause, of the gangrene. It may be remarked also, that the appearances described and figured are those of simple fatty degeneration (not, as in Wiglesworth's case, including hyperplasia, and other results of inflammation), so that there is the more justification for regarding them as indicative of ascending degeneration, consecutive to the gangrene of the parts which they supplied.

The repeated observations of neuritis, or changes similar to those of neuritis, in cases of Raynaud's Disease, must be regarded as having an important bearing upon its pathology, but that neuritis is the cause, or even a necessary contributing cause, of the symmetrical gangrene, is not yet established or rendered probable by hitherto recorded cases. On this point, I would remark—(1) That the arrest of circulation in this disease is sufficient to account for gangrene, without invoking the aid of trophic nerve-lesion; (2) that peripheral neuritis is very common, and Raynaud's Disease comparatively rare; (3) that motor symptoms, usually present in neuritis, are absent in Raynaud's Disease; (4) that the sensory symptoms are obviously dependent on, or explicable by, the vascular disturbance; (5) that mere neuritis cannot account for the distinctly paroxysmal type of the disease; (6) that the occasionally associated aphasia, glycosuria, hæmaturia, blindness, and deafness, all transitory, are entirely consistent with the theory of a central vaso-motor disturbance, and entirely irrelevant to that of a neuritis.

AORTIC INCOMPETENCE AND LOCOMOTOR ATAXIA.

By D. Colquhoun, M.D. Lond., M.R.C.P. Lond., Dunedin.

About two and a half years ago, I had under my care a woman suffering from mitral incompetence, in whom there were marked symptoms of inco-ordination of the lower limbs, with abolition of the patellar reflex. Shortly afterwards, the first of the two cases, whose histories follow, came under my care. The symptoms presented seemed clearly to be those of locomotor ataxia, but on account of the heart lesion accompanying them, it seemed to me to be not unlikely that the deficiency in the functional activity of the cord, in this and my previous case, was due primarily to imperfections of the circulation. In a little more than twelve months, a similar case, also detailed in this paper, came under notice in Dunedin Hospital, and I learned from the *Medical News*, of Philadelphia, that the coincidence of aortic regurgitation and locomotor ataxia had been already discussed in the *Berliner Klinische Wochenschrift*. I take the following account of the discussion from the *Medical News* of July 7, 1888 :—

"Berger and Rosenbach, in 1879, called the attention of the profession, in a brief notice in *Berliner Klinische Wochenschrift*, to the association of

aortic insufficiency with locomotor ataxia. They published notes of seven cases, without comment. In the following year, Angel, in an article in the same journal, entitled, 'The Coincidence of Heart Lesions with Tabes,' reported on a series of twelve patients suffering from locomotor ataxia, five cases in which there was the sign of aortic insufficiency, namely, a diastolic murmur, present however only after muscular effort, and disappearing during prolonged rest. The murmur was not heard at all in the morning, while the patient still remained in bed. This observer regarded the murmur in question as due to abnormal action of the heart muscle.

"Groedel, whose opportunities for the study of locomotor ataxia at Bad-Nauheim have been very extensive, regards the occurrence of cardiac affections in this disease as wholly accidental. In this view, he concurs with Eulenburg and Erb. Between 1875 and 1879, namely, at a time when his attention had not yet been especially called to the subject, Groedel noted, in forty-three cases of ataxia, only two in which the signs of valvular disease were present. Between 1880 and the close of 1887, a period during which every case of locomotor ataxia was studied with especial reference to the condition of the heart, valvular lesions were detected in only four out of one hundred and eight cases, and in no instance was he able to recognise the murmur of aortic insufficiency after muscular exertion, as described by Angel. Cardiac phenomena of a different kind were, however, very frequently observed. These consisted of feeble action of the heart, increased frequency of the contractions, small pulse, faintness of the sounds, manifestations not only common in enfeebled subjects, but also in those still well nourished and strong. In only two instances were these symptoms associated with the signs of dilatation of the right and left chambers of the heart."

It is evident that Groedel's observations were made on patients whose primary disease was locomotor ataxia, and they can hardly be said to negative the possible connection between some cases of aortic insufficiency and the development of symptoms of locomotor ataxia. It seems to be a point worthy of observation, whether valvular lesions, accompanied by failing compensation, may not be frequently accompanied by symptoms such as are met with in locomotor ataxia. Probably too, the prolonged action of this cause—failing compensation—may give rise to changes in the posterior columns of the cord, which may remain when the failure has been partially recovered from.

Dr. Moxon, in his Croonian Lectures on the Influence of the Circulation on the Nervous System, has pointed out that the blood supply of the cord is so distributed as to make the lower part of the cord especially liable to suffer from deficient force of the circulatory apparatus. The supply from the vertebral arteries has to be supplemented by a precarious supply from below, the re-inforcing vessels reaching the cord along the strands of the cauda equina, at an exceedingly disadvantageous angle.

It seems hardly reasonable to dismiss such cases from consideration as merely coincidence, when the causes assigned seem fairly to account for the symptoms produced. I will now submit my two cases for your consideration :—

A. H. S., a gentleman, aged 55 years, consulted me first in September 1886. He then complained chiefly of giddiness, especially on sudden movements, and of loss of sight for a few seconds under the same cir-

cumstances. He had not been well for months, but had intervals of comparative ease. For the greater part of his life, he had been a very strong and healthy man. He was born in England, but left it as a boy, and had worked as a digger in California, Victoria, and New Zealand, leading a hard life. He was more than usually active for many years, able to walk up hill, or run and jump, with less distress than most men. He had never any serious illness, was married, and the father of ten children, all of whom were healthy.

For some months he had noticed that he staggered in the dark, and that when he closed his eyes at the washhand basin, he could not balance himself. On rising from a chair, he said he would often stagger as if he had been drinking. Two years before, he had pains in his back and round the body, but these had not lasted long, nor been intense. There were no lightning or rheumatic pains in the limbs. He had for about four or five months difficulty in retaining his urine; it came from him suddenly with some force. On examination, the urine was acid, specific gravity 1018, not albuminous, and normal in quantity.

Both pupils were contracted, the right almost to a pin-point. His sight was, and had been, good. The patellar reflex was absent in both legs. He slept badly, dreamed a great deal, and was drowsy all day. Digestive power was only fair. He was often bilious, but had no vomiting attacks. Bowels, as a rule, were constipated. He was fairly nourished, but said he had lost about sixteen pounds weight in the last six or eight months.

There was visible pulsation in the great arteries of the neck, and in the arteries of the arm, most marked when the arms were raised. The area of cardiac dulness was considerably increased; there was heaving, diffused pulsation over the cardiac area, and the heart's apex could be felt about three inches below the left nipple, and two and a-half inches on its outer side. The first and second sounds of the heart were replaced by murmurs heard towards the base, and conducted to the apex. The pulse was slow, about sixty to the minute, and presented the characteristic sphygmographic tracing of aortic regurgitation.

I have seen this patient at intervals since the above notes were taken. He has had several angina-like attacks, but has been able to attend to his business (that of a brewer) until within the last month (beginning of November 1888). His present condition is that of marked failure of compensation. There is a small amount of albumin in his urine, partly due to pus from cystitis. He has œdema of the feet and legs, and some ascites, and frequent and distressing attacks of dyspnœa, which are controlled by small injections of morphia and digitalis. There is no advance in the ataxic symptoms.

The following case was admitted into the Dunedin Hospital on November 5, 1887, where he was under the care of Dr. De Zouche, and afterwards of Dr. Stenhouse. I am indebted to those gentlemen for permission to use their notes, and also for the opportunity of examining the patient from time to time:—

James B., aged 45 years, a miller by occupation, complained on admission to the hospital of numbness in the arms and legs, and almost complete inability to walk. About a month before admission, he had severe "rheumatic" pains all over the body, but especially in the legs, from the hips downwards. He was unable to pass urine; desired to do

so often, but on making the attempt, felt great pain in the penis. He then came to the out-patient room, and Dr. Roberts drew off the urine with a catheter. He had subsequently great pain in the region of the bladder for two or three hours, but was afterwards able to pass a little urine for a few days. During all this time his legs felt tired, and the left foot became numb. He has had shooting pains in the legs for years past. Twelve or thirteen years ago he worked in water for a day or two every week for some months. He has had no illness of any kind that he knows of, and has always been a very temperate man. While at his ordinary work, he was always a good deal exposed to cold.

His father is alive, aged 76 years, and has always been healthy. His mother died in child-bed, and there is no history of any constitutional weakness in his family.

Patient is a tall, strongly-built man, very anæmic and feeble-looking. There is visible pulsation in the arteries of the neck and arms. The pulse is full and bounding—the water-hammer pulse. The area of cardiac dulness is increased, and the apex beat is some distance to the left of and below the normal position. The first and second sounds of the heart are replaced by well marked blowing sounds heard at the base, mid-sternal region and apex. The pulse is 105, respirations 27, temperature normal. The tongue is transversely fissured and red, the bowels are usually constipated, and digestive power is weak. There is deficient control of the bladder; the urine is normal in character and amount.

He cannot stand with his eyes shut; patellar reflex is absent in both legs, and his gait is weak and uncertain. Muscular power is good in both legs. The joints are normal. He complains of feeling numbness over the mid-dorsal region of the spine for about three inches of its length, and of a tender spot towards the lower end of the dorsal region, and first lumbar vertebra. The flexors of the left leg respond only slightly to the induced current, the flexors and extensors of the right leg respond freely. The skin over both legs is somewhat anæsthetic.

Intelligence is good. He complains of occasional dimness of sight; but there is no record of ophthalmoscopic examination, or of the condition of the pupils.

He had symptoms of failing compensation of the heart. Dyspnœa on exertion, &c. After staying for some months in the hospital, he left somewhat improved in his general condition, but, of course, with the special diseased organs unimproved.

In these two cases, the questions arise: Is the condition that of aortic regurgitation, with failure of compensation, accompanied by locomotor ataxia as an accidental complication? or, do the ataxic symptoms depend on changes in the spinal cord, due to imperfect blood supply? In both cases there is an absence of syphilis, which we know is a potent agent in producing locomotor ataxia. In the first case, the patient was exposed to cold and wet, which may have produced chronic inflammatory changes in the cord; but the second patient has been for years leading a particularly quiet, regular life. In both, it was impossible to fix exactly the date of appearance of the ataxic symptoms, but they seemed to be nearly coincident with the first signs of failing compensation in the heart.

Again, locomotor ataxia is usually a disease of many symptoms—there may be changes in the eye, in the muscles of the eye, gastric disorders,

skin troubles, joint affections, lightning pains, &c. In these two cases the symptoms of locomotor ataxia were limited to the want of co-ordination, when the eyes were shut or not available, the absence of the patellar reflex, and want of control over the bladder, with a few minor disorders of sensation. The nervous phenomena were such as might result from passive congestion of the posterior columns of the cord. In neither case was the disease markedly progressive, although it must be noted that the time for observation has been limited. It seems to me that these cases can be separated from ordinary cases of ataxia. I should be inclined to describe them as cases of aortic insufficiency, with ataxic symptoms. I think the evidence is decidedly against the suggestion, that locomotor ataxia has anything to do with producing aortic disease. But there is not sufficient evidence in the meantime to prove, or disprove, that cardiac incompetence may give rise to symptoms of locomotor ataxia. It is with the hope that attention may be directed to this point, that I venture to place these two cases on record.

CLINICAL NOTES ON SOME CASES OF CEREBRO-SPINAL FEVER.

By William Finlay, M.D., Bathurst, N.S.W.

Case I.

On the evening of the 16th April, 1887, I was called to see a young man 21 years of age, a labourer, some fifteen miles distant. He had always enjoyed good health until some eight days previously, when he was suddenly seized with chills, vomiting, intense pain in the head, back of the neck and spine, accompanied with great weakness of the lower extremities. He was conveyed in this state to Bathurst, on two occasions, to consult a medical practitioner. He gradually got worse, and I was informed that he had taken "a fit" the previous evening, and force had to be used to keep him in bed. During the day, he had been quieter, but towards evening was getting more delirious.

On examination, I found the tongue whitish, large, and flabby; the skin cold and pallid; hyperæsthesia well marked over the entire body, and especially over the cardiac region; photophobia and hyperæmia of conjunctiva; temperature in axilla, 96° F.; pulse 48, and rather full; respirations shallow and increased in frequency. The head was drawn back to nearly a right angle, the back arched forwards, the thighs and legs flexed and somewhat rigid, but could be easily moved. For a time he would remain quiet, until a paroxysm of pain would seize him, when he would toss about, and uttering a piercing shriek, exclaim "Oh! my head!" requiring force to keep him in bed. He complained of pains all over, but worse in the head, back of the neck, and spine; the paroxysmal attacks, he said, felt like some one driving a nail into the crown of his head.

While I was present, he was seized with a tonic convulsion, and his body bent like an arch. This convulsion lasted two or three minutes, when he again resumed his former position. One drachm of the liquid extract of opium, combined with ten minims of the tincture of digitalis, was administered ; and a mixture, containing ten grains of the bromide of sodium, thirty grains of the hydrate of chloral, fifteen minims of the ordinary solution of the hydrochlorate of morphia, and ten minims of the tincture of digitalis prescribed, to be given, well diluted in water, every four hours, till the pain in the head was relieved.

On the following day, August 17th, I was informed that he had several convulsions during the night. The temperature was 96° F., pulse 60, respirations shallow and frequent. Still complains of his head, and aches all over ; seems stupid and apathetic ; retraction of head and aching of spine still present. A papular eruption on forearms, consisting of a few whitish raised spots, about one-eighth of an inch in diameter, and feeling exactly like a split pea under the skin. Seemed much weaker.

During the next twenty-four hours, he was for the greater part of the time delirious. The temperature in the axilla was 98° F., pulse 68, respirations shallow and frequent, hyperæsthesia still present ; shrinks when pressure applied to the skin. Papules on arms more numerous, and now found on legs, with mottling of arms and legs, but only extending as high as elbows and knees.

For the following three days the stupor became more profound, the pulse increased in frequency, the mottling on the arms and legs was of a duskier hue, and on the 22nd, I discovered a large, irregular-shaped, reddish patch on the left infra-dorsal region, extending in length about four inches, and about two and a half inches in breadth. He remained in the same condition till the 26th April, 1887, when the tongue was found very much swollen, and almost black, and several reddish-black spots had appeared on the legs.

During the 27th and 28th, the spots on the legs had gradually increased in size, and coalesced. He died early on the morning of the 29th, and in a few hours the whole body had become almost black. No autopsy allowed.

Case II.

Was that of a boy, seven years of age, who was just recovering from an attack of enteric fever. I was asked to visit him on the evening of the 13th May, 1887. He was vomiting, and complained of great pain in the back of the neck, and every little while would cry out, " Oh ! my head !" He was very irritable, and showed great aversion to anyone approaching him. The face was flushed, the tongue white and flabby, the temperature in axilla was 102° F.; pulse 130; respirations normal. Prescribed a mixture containing four minims of the tincture of aconite, five minims of the compound tincture of cinchona, and two grains of the iodide of sodium in each dose ; to be given, well diluted in water, thrice daily.

During the following night, he was wildly delirious, and on the 14th I found it impossible to take the temperature or pulse, on account of the hyperæsthetic condition of the skin, and his attempting to strike, kick or bite, if you approached him. The head was then retracted, with photophobia and suffusion of conjunctiva. He would lie quietly for a

few minutes with the eyes nearly closed, and turned away from the light, till another exacerbation would set in, when, with a shriek, he would complain of his head.

On the 15th, he was in a similar condition, and a gag had to be used to administer food and medicine.

On the 16th, he was very weak, but still dared anyone to approach him. In addition to the retraction of the head, the spine was now arched forward, and the thighs and legs flexed.

On the 17th, a hard, shotty eruption appeared on the arms and legs; skin cold and pallid. The treatment was then altered, and fifteen grains of the bromide of sodium, ten grains of the hydrate of chloral, and five minims of the ordinary solution of the hydrochlorate of morphia were given every four hours, well diluted in water.

On the 18th, he was much quieter, but resists when you attempt to administer food or medicine. For the following three days he remained in a state of stupor; skin cold and pallid. During this period, the mixture was administered thrice daily.

On the 22nd, he appeared to be able to recognise those around him, but his hearing was evidently affected. Eruption faded, leaving a slight mottling of the skin; hyperæsthesia less marked. The treatment was again altered, and eight grains of the iodide of sodium, ten minims of the B.P. solution of the perchloride of mercury, and five minims of the compound tincture of cinchona was given, well diluted in water, three times a day.

He steadily improved from the 22nd till the 28th May, 1887, when he again complained of a severe pain in the head and back of the neck, but the symptoms were quickly relieved by the administration of the bromide of sodium mixture, given three or four times. On the 30th, he was quite free from pain, and from this date onward the improvement was permanent, and I last saw him on June 12th, 1887, when he seemed quite recovered from the effects of his illness.

Case III.

This was a young unmarried woman, of fine physique and good family history. She had been feeling out of sorts for seven or eight days, but able to perform her usual domestic duties. On the evening of the 19th July, 1887, I was hastily summoned to visit her. While attending to the household work, she was suddenly seized with an attack of vomiting, intense pain in the head, and aches all over. The face was flushed, the tongue whitish, large, and flabby; the conjunctiva red and suffused, with photophobia; and the head thrown back. The temperature in the axilla was 100°F., and the pulse 84.

Treatment.—For the cerebral symptoms, forty-five grains of the bromide of sodium, combined with thirty minims of the compound tincture of cinchona, was given every four hours, well diluted in water. The vomiting was checked by giving thirty grains of the subnitrate of bismuth in milk every two hours; and the patient's strength maintained by administering a dessertspoonful of brandy in water every four hours; the diet restricted to boiled milk. The room was darkened, all noise excluded, and the patient kept thoroughly quiet.

On the following day, the temperature was 99° F., pulse 82; and I was informed that she had been delirious all night, but since morning

had been quieter, with lucid intervals. When conscious, she was extremely irritable, and complained of pain in the head, back of the neck, and on movement along the spine. Muco-purulent discharge from both eyes, lids tumefied, cornea clouded, and considerable uterine hæmorrhage. At 11 p.m. a sleeping draught containing thirty grains of the hydrate of chloral, thirty minims of the ordinary solution of morphia, and five minims of the tincture of digitalis was administered.

On the 21st, the temperature was 100° F., pulse 80. She had slept quietly till 2 a.m., was then very restless; cutaneous hyperæsthesia more marked over the region of the heart; uterine hæmorrhage still continued.

On the 22nd, she slept till 5 a.m. Three dark-red irregular-shaped purpuric patches along the spine, in the dorso-lumbar region; uterine hæmorrhage less profuse. Now lies in a state of stupor, with head retracted, and thighs and legs flexed. She remained in this state till the 25th, at times becoming delirious, and with difficulty kept in bed, and then again relapsing into a state of stupor. Treatment continued, with the evening draught omitted.

On the 26th, the temperature was 98° F., pulse 64, and she could then recognise those around her, but was very irritable and weak; purpuric patches faded, hyperæsthesia of skin and hyperæmia of conjunctiva disappearing.

Prescribed twenty grains of the iodide of sodium, ten grains of the bromide of sodium, and twenty minims of the compound tincture of cinchona; to be given thrice daily, well diluted in water. At 11 p.m. a draught was given for three nights, containing thirty grains of the hydrate of chloral, and twenty minims of the ordinary solution of the hydrochlorate of morphia.

Very slowly, but steadily, the patient improved in health, making an uninterrupted recovery, and by the 18th of the following August, was so far convalescent as to stand the strain of being removed to another part of the colony for a change.

Case IV.

Was that of a strong, robust young man, 21 years of age, a brother of the young woman, the history of whose illness I have just related. This case presented features of unusual interest to me, as I was present when he arrived home, to all appearance with the picture of robust health; and within three hours I was called to see him, to find him in a condition of extreme danger.

He had been employed on a station, seventeen miles distant, and, hearing of his sister's illness, he rode over on the evening of the 26th August, 1887, feeling in the best of health. Two hours after, he was suddenly seized with diarrhœa, pain in the head, back of the neck, spine, and lower extremities. The greater part of the time he had spent in his sister's room, the curtains of the bed were drawn close to exclude the light, and he had been caressing and hovering over her a good deal.

Before I arrived, he had been removed to another house, a little way distant. He was then in a state of collapse, skin cold and clammy; temperature 96° F., pulse 48, pupils dilated, the head thrown back, the spine arched forward, the thighs and legs flexed, with considerable rigidity of the limbs. He complained of pain in the back of the neck,

and, when the pain in the head became agonising, he would scream, "Oh! my head!" The paroxysm would last two or three minutes and then abate, when he would lie and moan.

Treatment.—The diarrhœa was controlled by a mixture containing bismuth, diluted sulphuric acid and morphia. For the cerebral and spinal symptoms, forty-five grains of the bromide of sodium, combined with ten minims of the tincture of digitalis, were given, well diluted in water, every four hours, and a tablespoonful of brandy in water thrice daily. The room was darkened, all noise excluded, and the patient restricted to a diet of boiled milk.

On the 27th, the pain in the head was greatly relieved; complained of pain in the back of the neck, and, on movement, along the spine. Photophobia and suffusion of conjunctiva; hyperæsthesia of skin, more marked over the cardiac region; temperature 98° F., pulse 60.

On the 28th, I was told that he had been delirious all night. Complained of pain in the back of the neck and limbs. Photophobia and hyperæsthesia still present. The temperature was 98·6° F., pulse 60. Prescribed sleeping draught, containing chloral and morphine.

On the 29th, he had slept till 6 a.m., quiet and apathetic; temperature 98·6° F., pulse 54.

On August 1st, he complained of pain only on moving; temperature 98° F., pulse 50.

On August 2nd, the pulse was 54, and on the 3rd was 60. On the 4th, a petechial rash appeared all over the body, with the exception of the head, hands and feet; and on the forearms a few whitish, raised spots, feeling hard and shotty; temperature 98° F., pulse 60.

This eruption remained till the 6th, then disappeared within 24 hours. Prescribed thirty grains of the iodide of sodium, ten grains of the bromide of sodium, and five minims of the tincture of digitalis, to be given thrice daily, well diluted in water.

From this time onward, he rapidly increased in strength, and was sufficiently recovered by the end of the month to perform light work.

Case V.

Was that of a young woman, 27 years of age, who consulted me on the evening of the 20th December, 1888. She had always enjoyed fair health, although never robust. On the previous day, she was suddenly seized with chills, vomiting and diarrhœa, severe headache, pain along the spine, which was aggravated on movement, and aches all over; so much so, that she said she could hardly bear her clothes to touch her. The temperature was 99° F.; pulse 110; the tongue large and whitish.

Treatment.—Rest and quietness was advised, and thirty grains of the bromide of sodium, combined with ten grains of antipyrin, were given, well diluted in water, thrice daily. On the 21st, the pain had nearly disappeared. The administration of the mixture was followed by free diaphoresis, and she is now slowly recovering from the extreme prostration produced by the illness.

Remarks.

The last case may be cited as an example of a large number that have occurred in my practice during the last fifteen months; and I consider they may be properly classified as aborted cases of cerebro-spinal fever.

The symptoms, as they appeared during the progress of the disease, may be briefly summarised as follows:—

There is the sudden invasion, intense pain in the head and back of the neck, generally radiating along the spine, and sometimes into the limbs. The headache is constant, and greatly aggravated by light, sound, or movement, whether active or passive. Then there is a chill, almost immediately followed by retching and vomiting. The tongue is large, white and flabby, later becoming brown; then, in serious or lingering cases, becoming swollen and black; the temperature in the early stage rising to 102° F., and in a day or two falling and remaining below the normal till convalescence sets in. The pulse and respiration varied considerably in most of the cases. Delirium sometimes violent in character, and usually eventuating in stupor or coma. Tonic contraction of the muscles of the neck and back. Hyperæsthesia of skin, generally more marked over the cardiac and epigastric regions. A hard, shotty eruption on arms and legs, only extending as high as the elbows and knees, accompanied later on by a dusky mottling of the skin over the same extent of surface. More rarely cutaneous and uterine hæmorrhages. In one case, a petechial rash appeared over the whole body, with the exception of the head, hands and feet. Neuralgic pains in thoracic and abdominal cavities. In every case, there was great prostration.

The treatment adopted, I have already related to you. In future, I would feel inclined to stimulate more freely from the commencement of the attack, and I believe more favourable results will be obtained. As to the cause or origin of the disease, I have no new theory to advance. When the first cases came under my observation, I was led to think that inferior flour had something to do with its causation; as, on enquiry, I found that a considerable number of those attacked obtained their bread from the one baker; but when we consider that in almost every case, only one member of a family was attacked, we must grant that this hypothesis is untenable. On the same grounds, we must exclude the water supply. In many of the cases, the dwellings and drainage were far from being models of sanitary science; but, in others, little fault could be found with the surroundings.

ON SOME FORMS OF SUNSTROKE OBSERVED IN CHILDREN.

By W. K. MacRoberts, M.B., L.K.Q.C.P.I., Newcastle, N.S.W.

Late Physician to the Wentworth District Hospital.

The subject of sunstroke—insolatio—heat apoplexy, pure and simple, has always appeared to me to be peculiarly adapted for investigation by Australian enquirers. So far, the authorities have been Indian entirely. They have conjectured an etiology, including so many predisposing causes, that obtain very rarely, if at all, in these colonies, and least of all in the districts where sunstroke most prevails. The very complete symptomatology of the disease, contributed by Fayrer, MacLean, and Moore, shows a type, materially different from the Australian type, at least as far as my experience goes. And this has been borne home to me,

when seeking guidance from their works in many a perplexing case. As for the pathology, which should be the ultimate criterion of difference or identity, it is, so far, so vague and unsatisfactory, that a German observer, Arndt, discounts all the results of the Anglo-Indians, by the theory that their post-mortem manipulations were unskilful—"a conclusion not very complimentary," as Dr. Moore observes.

Now, it seems to me that there are many good *primâ facie* reasons, not only for variations of the Australian from the Indian type, but also for essential differences between them. Diversity of race, diet, and modes of life; the omnipresence of malaria in the one country, and its almost total absence in the other, occur at once, on reflection.

The number of predisposing causes enumerated as factors in India, as well as the number of varieties of the affection described, lend colour to the suspicion that many other febrile disturbances simulate, and sometimes actually "personate"—if I may use the term—the true cases of sunstroke. Nay, it is admitted by the authors, that this is probably often the case; and Hilton Fagge remarks, "I should imagine that a person, attacked on a very hot day in India with cerebral hæmorrhage or embolism, would be exceedingly likely to have his case set down as one of "insolatio," even by competent observers."

Of course, it is quite possible for mistakes in diagnosis, or confusion of types to occur here as well; but I would submit, that the chances of other morbific influences intervening "to darken judgment," are not nearly so many. In the first place, the reputation of the Riverina district for instance, which I take as the Australian type for salubrity, is a great contrast to the "bad eminence" of Bengal, in the opposite particular. Population is extremely scanty, there is no overcrowding, and epidemics are, therefore, few and far between. Malaria is absent, and the eucalyptus trees shed forth one never-failing antiseptic effluence in the bright dry air. When sunstroke occurs, it *is* sunstroke, a veritable *ictus solis*, from—

> "The stress of the noontide—those sunbeams like swords!"

The stroke is swift and sudden and obvious, and predisposing causes obtrude themselves very little on our notice.

For these and other reasons, I am inclined to think that the class of nervous affection, due to the action of excessive solar heat in the colonies, is more distinct, more clearly defined, and separate from extraneous confusing influences, and, therefore, more open to accurate scientific investigation, than the varieties hitherto described and investigated by the Anglo-Indian writers.

It is, however, in dealing with cases of sunstroke, in which the sufferers are children, that the classical descriptions of the disease appear most inapplicable. During the three hottest months of the summer of 87–88, in Wentworth, in the Riverina, I encountered a series of at least a dozen cases, in which the patients' ages varied from two years to twelve. In no case was there room for doubt that the action of the sun's rays was the actual *causa causans*, though hygienic and physiological conditions undoubtedly caused variations in the train of symptoms. The variations, though great in degree, were engrafted upon a distinct and peculiar type—a type very inadequately designated by the appellations of sun fever, ardent fever, or thermal

fever, and not to be accounted for on Murchison's theory of all the milder varieties of sunstroke being simply cases of intermittent fever.

It would rather appear that the undeveloped, or only developing, motor and special sense cerebral centres of children yield a different note to the stroke of the sun from that of adults. That the action upon them is at once more intense and more diffuse, as well as more lasting, as will be seen from a recapitulation of a selection of the cases. They followed each other with such rapidity in the very hot weather, as to suggest at first the advent of an epidemic of typhus, typhoid, or cerebro-spinal fever. However, I was able in each case to trace a history of prolonged exposure to the sun, preceding the onset of the symptoms. In fact, the sudden seizure after exposure was the only prominent feature the cases presented in common. Intense cephalic pain was also present in all, and, in the fatal cases, coma preceded death. For the rest, as will be seen in the detail of the cases, the symptoms varied on an ascending scale :—Severe pain, with constipation and delirium at night; cephalic pain, with cerebral vomiting ; pain, with convulsions ; pain, with asphasia and non-spastic hemiplegia ; intense pain, with spastic hemiplegia.

Case I.—R. P., æt. 5, presented a history of exposure to a hot sun, without a hat, at a children's picnic. There followed immediately an attack of cerebral vomiting, and severe occipital pain, and most obstinate constipation, which continued all through the illness, though previously the bowels had been free and regular. There was also considerable delirium at night, and temperature remained at 100° for four days. Relief was afforded by tepid sponging, K. Br. in large doses, and the use of injections. Recovery in about ten days.

Case II.—A. M., æt. 3, lived in the bush, exposed to afternoon sun, and woke up in the morning with all the symptoms of infantile paralysis. On examination, I found great loss of power in lower extremities, tenderness in legs, and all along the spine, on pressure ; slight retraction of head, and complaint of pain in nape of neck. Temperature 102° Fahr. Treated with strong counter-irritants along spine, blister to occiput, followed by small doses of quinine. All the symptoms disappeared in three days; but three weeks after this, there was, unfortunately, another long exposure to the hot sun, an attack of vomiting, followed by convulsions, coma, and death.

Case III.—D. M'L., æt. 10, a child of full habit of body. History of violent exertion—running up a hill on a hot day with hat off. A sudden attack of complete aphasia and right hemiplegia, which lasted seven days, and then began to disappear together. Treatment consisted in rest in dark room ; blister over left half of cranium ; calomel in $\frac{1}{12}$-grain doses every quarter of an hour, and gr. x of K. Br. at night. Improvement began on the eighth day, and under quinine, strychnine, and Faradism, a complete cure was effected in 36 days.

Cases IV. and V.—Two children—sisters—æt. 4 and 5 respectively, were suddenly attacked together with occipital pain and convulsions, after wading in the river on a hot day. These cases ran a very rapid course, death occurring on the fourth and fifth days, after convulsions and coma. Calomel was given, as in Case III. The wet pack was tried, and in each case brought down the temperature from 104° to 103° Fahr. on the first application, and after that had no effect.

Case VI.—S. B., æt. 12, a resident at the irrigation colony of Mildura, then in a very primitive state. She had been living in a tent, and seems to have been badly nourished. She was decidedly overgrown; had been ailing with headache and feverishness for some days before I saw her, after exposure to great heat. Having been consulted by her father, I advised a continuous wet pack, which was not applied. She was admitted to hospital subsequently in a hopeless condition; temperature, 107°. Convulsions every five minutes, and between the fits rigid contraction of the muscles of the right side of the body. Intervals of semi-consciousness, during which intense cephalic pain was evidently present; contracted pupils. Wet packing tried, and reduced temperature 2° Fahr., but only temporarily. Rectal irrigation with cold water also tried, with no effect. Counter-irritants were also ineffectual. Coma supervened, and then death, in twenty-four hours after admission.

Such are the six cases I desire to present to your notice. I had others, probably of the same nature, but I have omitted them, because the history of exposure before the attack was not so clear and unmistakable as in these. The cases unfortunately lack the essential interest of a post-mortem; but the train of symptoms following a sunstroke are sufficiently striking to draw attention to them. They present few points of similarity to any of the varieties of insolatio in adults. The convulsive and paralytic notes are here the dominant ones. A comparative physiology of children is wanted, to show how and to what extent their heat-regulating and vaso-motor centres react to external impulse. Roughly speaking, I should say that the heat-regulating centre of Naunyn, Quincke, and Ott was, in these cases, directly and powerfully affected; and that simultaneously other centres lying in close proximity, and probably less disconnected from, and independent of it, than in the adult, were excited to discharge their influences by the same cause. Kussmaul and Tenner vouch for the existence of a spasm centre, at the junction of pons and medulla, extremely sensitive to the action of venalised blood, and to direct stimulation of any sort. The action of a temperature of, say 110° Fahr. in the shade, through the delicate cranium of a young child, upon its cerebral vessels, would certainly amount to direct stimulation of a good many cortical centres, and even medullary tissues. It is to this direct action, rather than to that of venalised blood, I am inclined to ascribe these cases; and it is to some therapeutical method, promptly directed to the heat-regulating centre, I would look for success in treatment. As will have been seen, my treatment was empirical, and only moderately successful, for want of reliable authorities to look to for guidance. It was only in my last case (Case VI.) that I came, as I believe, on the right track, and then it was too late. Even at the eleventh hour, however, a 12-grain dose of antipyrin produced a fall of 2° Fahr., and a slight and momentary cessation of symptoms. The earliest and the latest experiments upon the action of this invaluable drug, alike point to the conclusion, that its action is directly upon the heat-producing centre in the corpora quadrigemina. Anyone who has made much use of it, be he a physiologist or not, must come to the conclusion that it goes straight to head quarters, wherever they may be, and does its work with business-like promptitude. Here we have, I should think, the true and reliable remedy; and, except where heart failure is threatened, I now

commence the treatment of any case presenting febrile and cerebral symptoms combined, with an appropriate dose of antipyrin, by this means, I consider, obtaining a decided vantage ground at the start, as its action is as certain as clockwork.

However, here I leave my cases to your consideration, and earnestly invite discussion and further investigation by Australian practitioners of this peculiarly Australian subject. As a lethal agency among the children of our imperfectly acclimatised race in the hot districts of this continent, I am confident that sunstroke in some form or other is almost supreme. No effort has yet been made to follow the obviously useful hygienic example of the Chinese and Hindoos, who shave their heads, and by the use of fans producing a cool current of air, can walk about uncovered under the hottest sun. At any rate, European parents who, in temperatures ranging to 110° in the shade, allow their children to go about with heavy hats and long thick curls, may perhaps soon learn from the indigenous Asiatics, that safety lies in the opposite direction. "Sun-bonnets," with which little girls are particularly liable to be afflicted, are, I think, most objectionable. The best form is a light, well-ventilated straw hat, which should serve until we reach, in process of evolution, the shaven crown and palmetto fan. Why, too, our children in the Riverina district are expected to sit in school all the hot summer afternoon, and return home sometimes long distances at the very hottest period of the day, while their little Anglo-Indian cousins think of nothing but siesta after twelve o'clock till the evening cool, it is hard to understand. At any rate, they are expected to do it, and this type of disease is one of the outcomes of the system. Acclimatisation is going on, and it will not be entirely accomplished in one generation. As it is, I have noticed a remarkable difference in the capacity for standing heat between the children of Europeans and those of the colonial born, while Chinese half-breeds seem to enjoy a happy immunity from adverse solar influences. And here, perhaps, arises another question within the Chinese problem, for the number of children of Chinese fathers and European mothers already bears a high proportion to the total juvenile population in and around Wentworth, and I believe in Wilcannia also; whether they may not prove the "fittest" in the hard struggle for existence in those districts, is an open but alarming question.

As an appendix to these notes, I would call attention, if it has not already been done, to the great prevalence of a form of occipital headache among adults in the Wentworth district. It is always regarded by the sufferer as the remains of a "touch of the sun," and seems to be really due to a congested condition of the occipital dura mater. It is relieved by leeching over the sinuses; and, by a long course of iodide of potassium, is usually permanently cured. Sometimes intense pain is complained of in this region, and in such a case, I have always found tinct. cannabis indicæ, in 30 minim doses, a certain means of relief.

TYPHOID FEVER.

A General Meeting of the Congress was held in the Wilson Hall on Friday, January 11th, 1889, at 2 p.m., the Honourable Dr. Taylor, President of the Section of Medicine, occupying the chair. The following papers were submitted concerning the history, etiology, pathology and treatment of typhoid fever. A discussion followed, which, on account of the limited time available, was restricted to the subject of etiology.

HISTORY OF TYPHOID FEVER IN VICTORIA, AND ITS ETIOLOGY.

By JAMES ROBERTSON, M.A., M.D.

Formerly Physician to the Melbourne Hospital, and Lecturer on Medicine in the University of Melbourne.

It will be readily allowed that typhoid fever is now endemic in Victoria, and, I believe, throughout the Australian Colonies. The question naturally arises—is it identical with the form of fever formerly designated "Colonial?" In answering this question, I avail myself of such information as is supplied by the writings of pioneer members of our profession. In the early days of the colony, prior to the discovery of gold, the prevailing fever was regarded as incidental to the climate, a seasoning fever, and was thence designated "Colonial." Colonial fever was described by one of the early medical pioneers (the late Dr. David John Thomas), as "bilious remittent," with typhoid symptoms, having no regular period of incubation, and running no regular course, but usually terminating in a critical discharge of dark-coloured bilious offensive matter.

The name "bilious remittent" suggests the idea that the so-called "Colonial fever" may have been due to malarial poison, emanating from marshy or swampy soil, and its being regarded as a seasoning fever tends to foster that idea. That such was not the case, however, may be legitimately inferred from the absence of any form of intermittent or malarial fever, originating in the Colony of Victoria.

Dr. Thomas afterwards stated that, on resuming practice in 1860, after a prolonged visit to Europe, he had not seen a genuine case of the old Colonial fever, and that typhoid seemed to have taken its place. The fever, prevalent on the diggings in 1854 and 1855, was described by another writer in the *Australian Medical Journal* (Dr. Hunt), as "fever associated with dysentery, not of the ordinary inflammatory type, but of a hæmorrhagic character—fever of the typhoid kind, which assumed a less severe aspect, with the gradually ameliorating circumstances of the digger's life."

My own recollection of the fever prevalent in Melbourne, extends to the year 1853. It was certainly of a very low type, and not infrequently attended with hæmorrhage from the bowels, a feature which stamped it as being true typhoid. The term "remittent" was doubtless used as

expressing the more obvious symptoms, the occurrence of exacerbations and remissions, for in those days the temperature was not tested by the thermometer. Typhoid often assumes a distinctly remittent form, in which the evening exacerbations and morning remissions are well marked.

A case of fever is reported in the *Australian Medical Journal*, January 1856, under the heading, "Autumnal Fever," by the late Dr. Tracy. From the symptoms described—"tenderness in the right inguinal region, hæmorrhage from the bowels"—it was evidently a case of typhoid fever.

According to Dr. Thomas, typhoid first appeared in the colony in 1842, being introduced by the ship *Salsette*. Three men from that vessel were engaged as farm labourers at Heidelberg, and were attacked by the fever. It proved fatal to two of them, and spread as from a centre, attacking others in the neighbourhood. Other immigrants from the same vessel, who went into the bush, were similarly attacked, and communicated the disease to others. I would observe that in 1842 the distinctive characteristics of typhus and of typhoid had not then been recognised. They were regarded as identical in their nature, mere varieties, due to the action of the same specific poison. Jenner had not then shed a light on their obscure relations. From the highly contagious character of the fever described, it may also be surmised that the form of fever was typhus, not typhoid. Typhus is found to be eminently contagious, and to spread directly from the sick to the healthy, while cases of typhoid may be treated in the wards of a general hospital, without the disease spreading to the patients in the adjoining beds.

Prior to the year 1860, the fevers prevalent in Victoria were known or described under various terms, such as "Colonial," "continued," "low," "bilious," "remittent," "bilious remittent" and "gastric." The variety of names arose, no doubt, from the sudden influx of medical men during the early period of the Victorian golden era, and the employment by them of such terms as they considered best descriptive of the nature of the fever met with.

On my appointment as Physician to the Melbourne Hospital in 1860, I employed the opportunities presented, and found that the autopsies in all fatal cases of fever revealed the same anatomical signs, according to the stage of the disease. The tumefaction and ulceration of Peyer's patches, and of the solitary glands, were found to be well marked in the lower part of the ileum, particularly in the neighbourhood of the ileo-cæcal valve. Cases of fever were found to vary much in regard to severity and duration, some being comparatively mild, and others very severe and protracted. The temperature was not always characteristic, the abdominal and intestinal symptoms varied, the rose-coloured spots and diarrhœa were often absent; yet, when opportunity offered in cases proving fatal by some complication, the intestinal lesions served to confirm the true nature of the fever.

Before commencing to write a course of lectures on fever (in 1864) for the Medical Students of the University, I had assured myself that, however the fever might vary as regards its symptoms, severity and duration, and by whatever names it might be designated, it was essentially the same in type; being, in fact, the true typhoid or enteric fever so prevalent in Europe.

From the evidence adduced by Dr. William Budd, of Bristol, England, and by others, I had also arrived at the opinion that it was communicated by contagion. On referring to my notes, written at that time on the causation of the fever, the first sentence runs thus:—"The weight of evidence unmistakably proves, not only that this disease is contagious, but that it is now only propagated by contagion." There is no reason to suppose that it was generated here, or that it existed among the aborigines. Their nomadic habits would, I believe, preclude its existence.

Typhoid fever has, at various periods within my own knowledge, been imported into the Colony from British ports, and the conclusion may be legitimately arrived at that it was originally so introduced, and had become endemic at a very early period.

Soon after the year 1860, the nomenclature of fevers gradually underwent a change, and the term "Colonial" was supplanted by "typhoid" or "enteric." In a letter under the heading "Hospital Mortality," published in the February number of the *Australian Medical Journal*, 1865, I wrote as follows:—"The statistics of the Melbourne Hospital are compiled by the Superintendent, and in classifying diseases, he is guided by the Nosological Table published by the Registrar General of the Colony, which certainly requires emendation before the fever statistics can be employed as reliable data for the purpose of comparison. The nomenclature adopted is faulty." All fevers were then classified under two heads or forms—I. "Typhus and Infantile Fever;" II. "Remittent Fever." I further noticed "that no case of typhus, of infantile, or of remittent fever, came under my care during 1863. The type of fever prevailing then was typhoid, as it is now" (1865).

In the August number of the *Australian Medical Journal*, 1867, is to be found a carefully-written paper by Dr. MacGillivray, of Sandhurst, "On cases of Fever occurring in the Bendigo Hospital," with statistics and temperature-charts. He there states:—"An opinion is held by some practitioners that, as well as enteric fever, we have here also a bilious remittent, to which the name of 'Colonial' is applied. So far as my experience goes, I can only say that I have never seen such a fever here."

There is now a general consensus of opinion, that typhoid is the prevailing form of fever met with in this Colony. The history of typhoid in Victoria differs but little, if at all, from the record of that disease in the other colonies, or in other countries. It prevails at certain seasons and in certain localities, influenced by filthy and unwholesome surroundings, but more especially by emanations from decomposing *excreta* of typhoid patients. It varies from year to year, as regards frequency and fatality, owing to meteorological changes, a mild winter and moist autumn betokening a severe typhoid season. A reference to the tables of mortality issued by the Government Statist shows that, while phthisis is the first of all diseases in causation of fatality, typhoid fever occupies the eighth place.

The annual mortality from typhoid in Victoria has varied from 3·49 to 7·26 per 10,000 persons living, during the period extending from 1873 to 1886 inclusive (14 years), the average being 5·23, exactly that of New South Wales. In Queensland, the death-rate from typhoid is much above that in Victoria; while in South Australia, Tasmania, and

New Zealand, it is lower; and in England and Wales still lower, in the five years ending with 1886. The mortality from typhoid in England and Wales has been reduced from 4·30 to 2·49, and this has been brought about by the adoption of general hygienic measures. The adoption of similar measures in Victoria would, without doubt, be attended by equally beneficial results.

Etiology of Typhoid Fever.

Typhoid is without doubt contagious, but not in the same way, or to the same extent as typhus, small-pox, measles, or scarlatina. These are highly contagious, and are readily conveyed from the sick to the healthy, within a very limited area, at all times, and I might almost add, at all seasons of the year, when immunity is not conferred by a previous attack. They are apparently conveyed by emanations or exhalations from the bodies of the sick. It is not so with typhoid. Seldom, if ever, is it communicated directly to patients in the adjoining beds in the wards of a general hospital. The conditions which tend to its spread are doubtful, or not yet fully understood. It is not conveyed immediately from the sick to the healthy. The exhalations from the lungs and skin, and even from the fresh discharges from the bowels, are only very slightly, if at all, contagious, otherwise more direct and satisfactory evidence of contagion would be available, such as is found in typhus fever, &c. Fresh or recent typhoid dejections are not regarded as contagious, but become so by exposure, or during the process of putrefaction, or fermentation. In proof of the innocuous character of fresh typhoid dejections, I may notice the fact, on the authority of Murchison, that the disease was not transmitted by feeding a pig on such dejecta, mixed with barley meal; on the contrary, the pig throve and waxed fat. It is otherwise, when pigs are fed with tubercular matter, or milk from tuberculous cows—they are said to fall victims to tuberculosis. Although fresh typhoid evacuations are not considered contagious, the exhalations from privies, cesspools, drains, and sewers, to which the discharges from typhoid patients have found access, are regarded as highly contagious. It has been found that water, from wells contaminated by percolation from such sources, has proved the carrier of contagion. Milk appears to have some special affinity for the contagion of typhoid, and to prove a very suitable medium for spreading the disease.

It is now generally accepted as proved, that contagious diseases are caused by the introduction of certain specific organisms or microbes into the bodies of those susceptible of contagion.

Bacilli have been detected by so many observers in typhoid cases, that their presence is now assured. They are found in the intestinal canal, in the lymphatics, mesenteric glands, spleen, liver, kidneys, &c., in small masses. They have been cultivated external to the body in stiff gelatine, but are confined to the spots where they have been implanted. A very important question still awaits solution—Have bacilli an independent existence external to the body? They are said to form spores at certain high temperatures (86° to 108° Fahr.) It may therefore be reasonably supposed that they meet with conditions favourable to their development in warm climates, and this may account for the prevalence of typhoid in warm countries.

It is only under certain conditions or circumstances that typhoid appears to be transmissible.

What are the conditions, local and personal, that induce typhoid? There is, it appears, a local or endemic influence, called into action more especially at a particular season of the year, and also a constitutional factor, rendering some more susceptible than others.

In this colony, typhoid is more rife in the autumn months, in that respect corresponding with that prevalent in Europe. In winter, with a low temperature, it is absent; on the return of summer, sporadic cases occur and become more and more numerous on the approach of autumn. It is about the end of autumn that the fever becomes most prevalent, particularly during the months of March, April, and May. The number of cases appears to be diminished in dry hot weather, and increased by heat and moisture. I have observed that after a rain-fall, cases of typhoid become more numerous. The contagia, be they bacilli or spores, then meet with certain conditions that render them active, or tend to their growth and multiplication. The season, favouring decay and putrefactive changes, is that in which typhoid flourishes.

Statistics prove that heat and moisture combined are followed by an increase of fever.

A tabular statement of climatic conditions, compiled by Mr. C. Moerlin, at the Melbourne Observatory, compared with one showing the number of deaths from typhoid prepared by the Government Statist, published by the late William Thomson, F.R.C.S., in his work on Typhoid Fever 1878, proves that the deaths from typhoid fever were especially numerous in the months of March, April, and May, from the year 1874 to 1878, inclusive, more so in those months when rain had fallen copiously. In making this observation, I am aware that the conclusion arrived at is somewhat at variance with that drawn by the author from the same data. The figures admit of the inference that warm damp weather contributed to an increase of the number of cases of typhoid fever, or at all events, to an increase of the number of deaths from that disease.

Many years ago, I expressed the opinion "that the frequent occurrence of typhoid fever in the autumn season, was mainly attributable to the facts, that heat and moisture favoured putrefaction, and that the atmosphere thereby became impregnated with emanations from decomposing excreta." This view would be more in accordance with the advanced pathology of the present day, if the word "bacilli" was substituted for "emanations."

Outbreaks of typhoid fever have not infrequently followed the opening up of offensive drains; but all exposed to the exhalations have not become the victims of fever. This brings me to notice the personal or constitutional factor in causation.

Assuming that bacilli are extensively scattered over a large area, or rather areas, in the typhoid season, as only a few persons become affected, it is evident that some predisposing cause or causes are in operation. For the germination and growth of a plant, we know that not only is the germ or seed necessary, but the soil fit for its reception, and other conditions, as regards temperature, moisture, &c.

We have found that the season of the year greatly influences the prevalence of fever. We find also that certain localities are more

particularly liable to its invasion, owing to local insanitary conditions. Whether these conditions operate by favouring the growth, multiplication, and greater activity of the bacilli, or by impairing the bodily health, and inducing some personal or constitutional susceptibility, are questions yet to be determined.

Age, without doubt, is a predisposing cause of typhoid fever ; children under one year do not appear to be liable to it, and even under five they do not readily contract it. From five to ten, and from ten to twenty, the fever becomes more and more prevalent with advancing years ; it reaches its climax, in point of frequency and severity, at adult age, and does not greatly decrease until after the age of thirty. It is a remarkable fact, that delicate persons are not so liable to fall victims to it as the apparently vigorous. One attack of the fever gives immunity to another, as a rule ; typhoid, in this respect, following the general law of eruptive fevers. This may explain, to some extent, the less frequency of its occurrence in advanced years, many having passed through the fever in early life. How far the changes that take place in Peyer's glands may contribute to that exemption, is a subject for inquiry.

What constitutes the personal or constitutional predisposition to fever? This is a point to be solved, *nodus vindice dignus.* It may be argued that the bodily functions have become impaired by the prolonged heat of summer—digestion, assimilation, and nutrition being rendered imperfect, and secretion and excretion defective ; that effete products have thus accumulated in the blood ; that vitality has been lowered, so that the system is less able to resist the attacks of bacilli. The increased susceptibility incident to adult age, may be accounted for by the active exertion, consequent on the daily duties of life, occasioning more tear and wear of the system, and thus increasing the effete products in the blood.

Again, it may be assumed that there is present in the system some suitable pabulum that affords support to bacilli, or ministers to their germination, growth, and multiplication, the presence of this pabulum constituting the determining, or immediately predisposing, cause of the disease. On this supposition, the mildness or severity of a case of fever might be accounted for by the amount of pabulum present in the blood ; should the amount be small, it would speedily become exhausted by bacilli, which would then perish, and become eliminated from the body.

How do bacilli gain access to the body? Are they inhaled ; or are they swallowed with food and drink? It is believed that they are generally conveyed through the medium of food and drink ; that they are taken into the stomach, and pass into the small intestine, where they are supposed to meet with conditions favourable for their growth. They are said to penetrate Peyer's glands, the mucous follicles, and lymphatics, and thus gain access to the blood, where, it is presumed, they grow and multiply. Their presence in the blood is, however, not well assured ; and in that respect, the bacilli of typhoid conform to the behaviour of the bacilli of tuberculosis, which are not, as a rule, observed in the blood, but are found in different tissues and organs of the body.

THE ETIOLOGY OF TYPHOID

By J. G. Carstairs, M.D.

Not so many years ago, it appeared as if the germ theory of typhoid, evolved by the genius of Budd, would shortly become the universally accepted belief of the profession. From some cause or another, the progress of that theory received a check; and now, up to the year that has just closed, with one exception, all recent English writers on fevers regard typhoid through pythogenic media.

However, as they have abandoned the doctrine of the generation of the poison *de novo*, and accepted the belief that the contagium is truly *specific*, and *always derived* from previous cases of the disease, the point at issue is virtually settled in favour of the germ theory, and Budd's views are vindicated. This forms my starting point.

By common consent, typhoid is admitted to be the result of the entrance into the body of a specific living contagium, always derived directly or indirectly from previous cases, which multiplies in the body, flows in the blood, permeates all the tissues, and is thrown off from the body to propagate itself afresh in suitable soil. The striking analogy to plant life in the multiplication of the contagium is universally recognised; and as the processes set up by it in the living body are always true to type, the conditions of its existence, growth, and other characteristics must be subject to fixed law. That the contagium lives indefinitely outside the body is indisputable; that, like other seeds, it lies dormant for a time, requires no proof; that, like them, it grows and multiplies, in obedience to natural law, is shown, on a large scale, by the periodic annual return of typhoid; and, on a smaller scale, by the cultivation experiments of the bacteriologist. But as this last point is an undetermined question with the pythogenic school, and virtually commands the position, let me illustrate it.

Germination of the contagium outside of the body.

Parenthetically let it be noted, that the average annual mortality for this colony from typhoid is 430, and that of Melbourne 212, or about one-half. From monthly statistics of the mortality in Melbourne, extending over twenty-four years, we learn that the average monthly mortality is at a minimum in November; thence it increases more or less rapidly, attaining its maximum from March to May. In June there is a sudden fall in the death-rate, which decreases monthly till the minimum is again reached. Now, the mortality in one month must arise largely from those who contracted the disease in the previous month, and as the rise in the mortality (consequent on the prevalence of typhoid) commences in December, most of the cases received their contagion in November.

The seeds of the contagium, which have lain dormant in the soil and elsewhere during the cold weather, have then begun to germinate in November, and multiply; and the increase of the mortality, amounting to 120 per cent. in December, is at once the result and the proof of their growth and multiplication.

When you see a crop of thistles growing, you know that the seeds from a parent thistle, which have lain dormant in the soil, have germinated; and when you see a crop of typhoid growing, you know that its seeds have germinated. You did not see the seeds of the

thistle any more than those of the typhoid, but you know the crop would not have appeared if the seeds had not been in the soil, and germinated.

The period of the germination of the contagium, therefore, commences in November, and is coincident with a mean temperature of the air of 60·2°, and of the surface soil of 69·5°. That this is no mere coincidence, is shown by the regularity of the yearly recurrence of typhoid, and further, by the fact that when the temperature in November is above the average, so is the prevalence and mortality in December; and when the former is below the average, so also is the latter. In other words, the season for typhoid is earlier or later. But the increased mortality in December is only the first fruit of the lethal crop. With the increasing temperature, the rate of multiplication of the germs of contagium increases, and as a consequence, the death-rate, till the maximum is reached in March to May; after that, the temperature having fallen below that of November, the germination in the open air is arrested. Hence, in June there is a sudden fall in the rate of the mortality, and as in December the rise was shown to be the result and proof of the multiplication of the germs, so in June is the fall the result and proof of its arrest. The specific living contagium of typhoid, therefore, germinates and grows outside the body, in the soil, or where it finds itself; and the condition of its growth and increase is a high temperature, such as we have here from November to April.

Gaffky, in his admirable treatise on "The Etiology of Typhoid," recognising the importance of ascertaining the temperature at which the bacillus of typhoid formed spores, that is, multiplied, made it the subject of careful experiment. The result I give in his own words, only substituting the degrees Fahrenheit for the centigrade scale he uses. He says:—

"The temperature most suitable for spore-formation seems to be from 86° to 104°. At 77° it occurs somewhat later, but still indubitably. The lowest limit seems to be 68°; at least, at this temperature, after eight days' growth, I have only observed a very few, and only moderately developed, spores in the bacilli. After two more days, the process was not much further advanced."

Further, Gaffky never found the bacilli "become causes of putrefaction, although sown in substances very liable to putrefy." A certain range of temperature was the sole condition for the sporing of the bacilli; and so, in the case of the germs, the spores, lying about this city, *obedient to the law of their life* they germinate, owing neither their evolution, nor their power of multiplication, to decomposition going on in organic filth, *but to heat alone.* And what happens here, will happen all the world over.

But here it may be asked, What of those cases of typhoid occurring from June to November? If germination of the contagium is arrested, why is the disease not arrested also? The reply is easy. The disease is largely arrested, as shown by the mortality, and though the germs cannot multiply at the outside temperature, yet they are there, and living; and as in the summer they find their way into the human body, so they can in winter, and once there, they find the condition and temperature most suitable for their growth.

This leads to the question of *the entrance of the contagium into the body.* Most recent authorities hold that the contagium finds its way into the

living body almost exclusively by the alimentary canal, in water, food, milk, &c. That it enters by the air-passages is admitted as a probability only—a statement of opinion that requires overhauling, like many others regarding typhoid.

That any article of food or drink containing the typhoid germs *does—nay, must*—of necessity produce the disease, goes without saying. That widespread and limited outbreaks have been traced to contaminated water-supply, is undeniable. But that the annual autumnal prevalence of typhoid, here or anywhere, is due to a regularly automatic pollution of food or drink, is neither consistent with observation nor common sense. Therefore, as by far the greater number of cases of typhoid happen during this regularly recurring period, their contagium does not enter the body by the alimentary canal, and must, therefore, do so by the air-passages. So far, then, from this being a probability only, it is a moral certainty.

A word about milk epidemics. I do not mean the spurious hypothetical, which require such an amount of ingenious reasoning to give them an appearance, and only an appearance, of truth; but the true milk epidemics, which possess one constant characteristic feature, viz., the presence at the farm or dairy of one or several cases of typhoid, the patients being nursed by those who milk the cows and attend to the supply. It is positively painful to read in the accounts of these outbreaks the minuteness of the details about middens, drains, leaky cesspools, and polluted wells, which are presumed to form the chain of connection between the patients and the contaminated milk. It is astonishing to see this roundabout way absorbing all the attention of the narrators, while the plain, the direct way, is staring them in the face. Daily, and for weeks together, does the nurse leave the bedside of the fever patient to milk the cows; her clothes and hands are saturated with the poison; the milk-pail is steadied between the knees, and the fingers are frequently dipped into the milk in order to lubricate the teats. Could the milk escape being contaminated? Long before the drainage from midden or cesspool could percolate to the well, the milk was infected by the hands, and the pail by the clothing of the milkmaid. Says Lawson Tait, "We now know that the raid against lying-in hospitals was a mistake. Destroy the germs on the hands of those who attend parturient women, and the women are safe." Destroy, then, the germs on the hands and clothing of the milkmaid, and the milk is safe.

Exit of the contagium from the body. All agree that the contagium leaves the body in the dejections; few admit of its elimination in the breath, or perspiration. The pythogenic school maintains that the fresh fæces are *innocuous*, and *devoid* of the power of contagion, but that after decomposition, *they certainly contain the typhoid poison.*

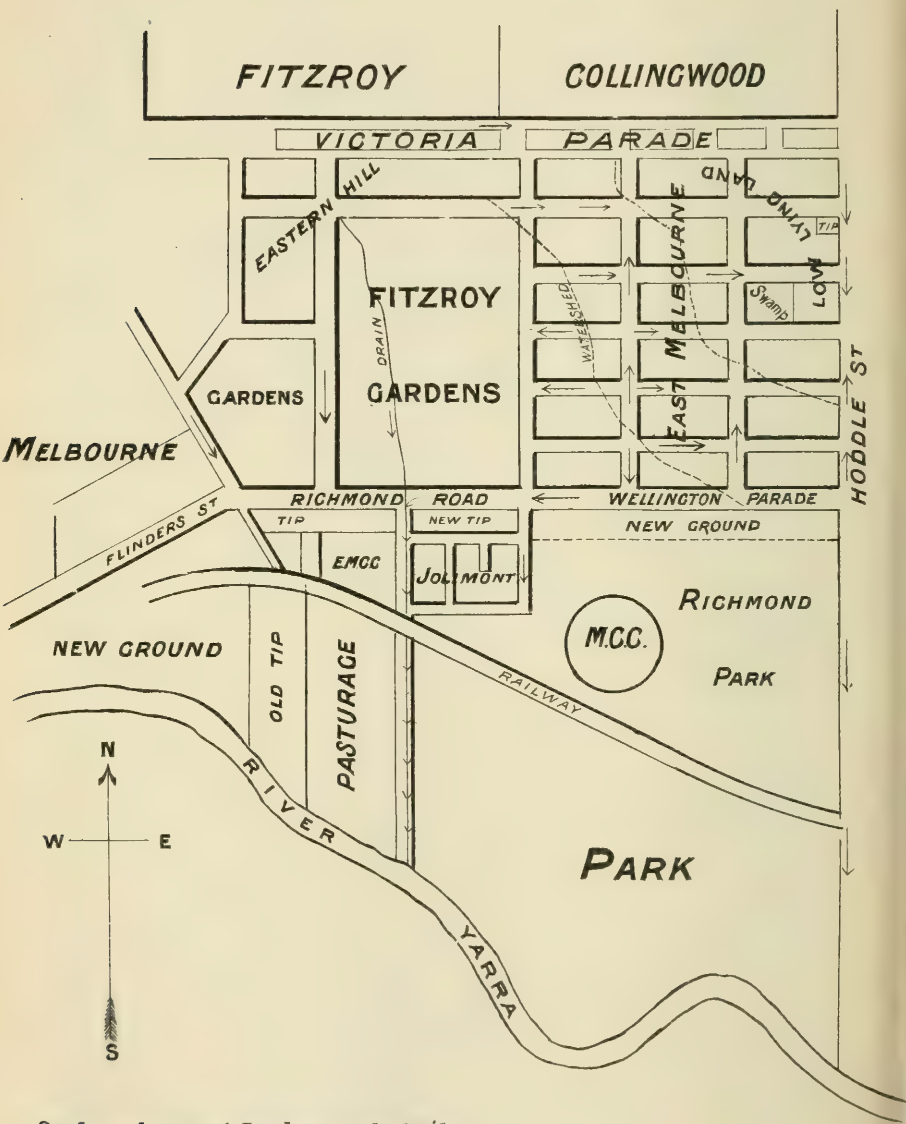
In a former portion of this paper, it was shown that the multiplication of the germs outside the body was due to heat alone. The question is not one of *acquired virulence*, but of *inherent life*. If the specific contagion, on leaving the body, has lost the power of *contagion—that is, of multiplying*, it is *dead*; and decomposition, instead of infusing life, will only disintegrate it. Again, if decomposed typhoid stools "certainly contain the poison," then of necessity it existed in the recent stools, for there is no spontaneous generation. No, the specific cause that has

wrought such havoc in the human body leaves it *a living self-propagating thing.*

But further, a contagium vivum that circulates in the blood, finds itself in the capillaries of the skin, and of all the organs of the body; and though we admit that its chief outlet is by the bowel, yet we cannot deny its elimination by all the emunctories. I need not remind you that, although the invariable anatomical lesion is situated in the ileum, yet the whole intestinal tract, from pharynx to colon, may be, and often is, the seat of inflammation and ulceration. To refer to the throat affection only, at times so severe as to have been mistaken for diphtheria, and which, if looked for, I fancy would be found more frequent than is generally believed, how will, how can the poison be eliminated but in the breath and sputum? and the same may be said of the ulceration of the larynx, the bronchitis, pneumonia and gastritis so often present. And what of the skin, with its extensive drainage surface, does it remain idle in presence of the common enemy? Throwing off, as it does, 80 per cent. of the body heat, and as the smell from its surface indicates the disintegrated products of tissue change, why not the contagium also? When the skin acts well in typhoid, the patient does well. It may be said, sweating reduces the temperature. True, but is it not by removing the fuel, the cause of the increased body heat? This brings me to the question of *contagion.* Not the communicability indirect, which is generally admitted, but the direct, from person to person, which most deny. Dr. Collie, of Homerton, is the only recent English writer on fevers who contends, and rightly contends, for direct contagion. If it is admitted that the views above stated are correct, viz., that the poison is eliminated by the lungs and skin, then the acceptance of the belief of *direct contagion* through their emanations cannot be withheld.

The limited time at my disposal forbids the giving the histories of cases in point to support the position—let me but indicate their meaning. A patient is brought from a distance to a locality where there is no fever; a relative sits by the bedside for a few hours once only; or another sleeps one night with the patient before the nature of the disease is known; both fall ill within a fortnight. Now had it been measles or scarlet fever, there would be no hesitation in saying they caught the disease directly from the patient. And when you see typhoid behaving in the same manner, arguing from the general to the particular, you say the same thing has happened—*direct contagion.* Again, when you find that a child of less susceptible age, who has been in this close contact, takes the disease, while several other members of the family of a more susceptible age, but who have not been in such close contact, escape—taking the positive fact that the less susceptible was attacked, and the negative fact that the more susceptible escaped, and that the only difference in their circumstances was that the one was in *close contact*, and the others *not*—what is the legitimate inference? Is it not, that the contagion distance is short? You admit this of typhus, why deny it of typhoid, with which it was so long confounded? The contagion is not of a volatile, diffusive nature; it clings to the body and clothing of the patient, it clings to its surroundings, it clings to limited areas of towns. It may be in a drain or dung heap, yet show no sign till the one is stirred up, or the other turned over.

GENERAL SKETCH OF LOCALITY.



Scale. about 4 Inches to the Mile.

In complete harmony with this view is the spread of typhoid in rural or thinly-populated districts from person to person, and family to family —first, to the members of the household to which a fever patient was brought; then, to the neighbours and friends who visit the house, and assist in nursing the patients. You have seen this scores of times. The journals here, and in the old country, abound with narratives of such outbreaks. There can be little doubt of direct contagion from all the emanations of the body.

To sum up, the *contagium of typhoid* grows outside the body, and the condition is a temperature from 70° to 104°. It enters the body largely through the air-passages. It leaves the body in all the emanations, though chiefly in the dejections. It is directly contagious, the contagion distance being short. Though necessarily present in filth, it owes nothing to that, save as a vehicle. Prevention—destroy the germs outside by improved sanitation. Let not another germ from typhoid patient live. Isolate the patient; burn the excreta; disinfect bed and body clothing, by exposure to a steam heat of at least 230°; disinfect the house.

TYPHOID FEVER CONNECTED WITH MILK-SUPPLY.

By H. B. Allen, M.D.

Professor of Anatomy and Pathology in the University of Melbourne.

On or about the 16th of March, 1879, the son of a milkman, named M., residing near the west end of Jolimont Place, fell ill; in a few days, distinct symptoms of typhoid fever presented themselves, and the disease ended fatally on the 2nd of April. Of ninety-three households in Melbourne and its suburbs supplied by the milkman in question, twenty-three were visited by the fever; forty-three individuals were attacked, of whom three died.

From this short summary, I may proceed to discuss—(*a*) the sanitary condition of Jolimont; (*b*) the history of the illness of young M.; (*c*) the milk-supply; (*d*) the outbreak of fever in Jolimont; (*e*) fever among M.'s customers in Collingwood, Fitzroy, East Melbourne, and Melbourne.

Jolimont is a small suburb situated on a gentle slope, between the Fitzroy Gardens on the north, and the low-lying paddocks by the Yarra on the south; east and west, it is bounded by the Richmond Park and the East Melbourne Cricket Ground respectively. It is thus comparatively isolated from the rest of Melbourne. The suburban railway line separates it from the flat grounds by the river, which are used as pasturage for cows. A short distance to the south-west, on the bank of the Yarra, was the old Corporation tip; and between Jolimont and the Fitzroy Gardens is a strip of open ground, which was used as a tip during 1878-9. These rubbish depositories were both extremely offensive during the latter part of 1878, and the early months of 1879. The new tip, though the smaller, was especially obnoxious, on account of its nearness to the houses. Decaying animal and vegetable matters were freely deposited there; the ground and the houses adjacent swarmed with flies; while the stench arising in the summer weather (when the temperature of the surface soil was exceptionally high) was almost unbearable.

Drainage.—The highest ground in Jolimont is at the north-east corner, while the opposite corner is low-lying, with a very slight fall towards the river. All the drainage of the suburb gathers into Jolimont Road, which also receives the water from the gully or open drain running through the Fitzroy Gardens. Many complaints have from time to time been published in the daily papers, concerning the offensive state of this gully.

Sewage.—So far as I am aware, there was not a single cesspool in Jolimont; the dry-pan system was universal.

Typhoid in Jolimont Prior to the Milk Outbreak.

In the fever season of 1878–9, the first case of typhoid in Jolimont occurred in November 1878, in a house in Jolimont Place, west of Agnes-street, and immediately opposite the new tip. In December, two cases occurred in a house about the centre of Jolimont Terrace. Of these one died; two fresh cases developed in the same house in the January following, and the family shortly after removed to Brighton. There is a history of fever in the house adjacent to this in previous years, but I have been unable to obtain any particulars.

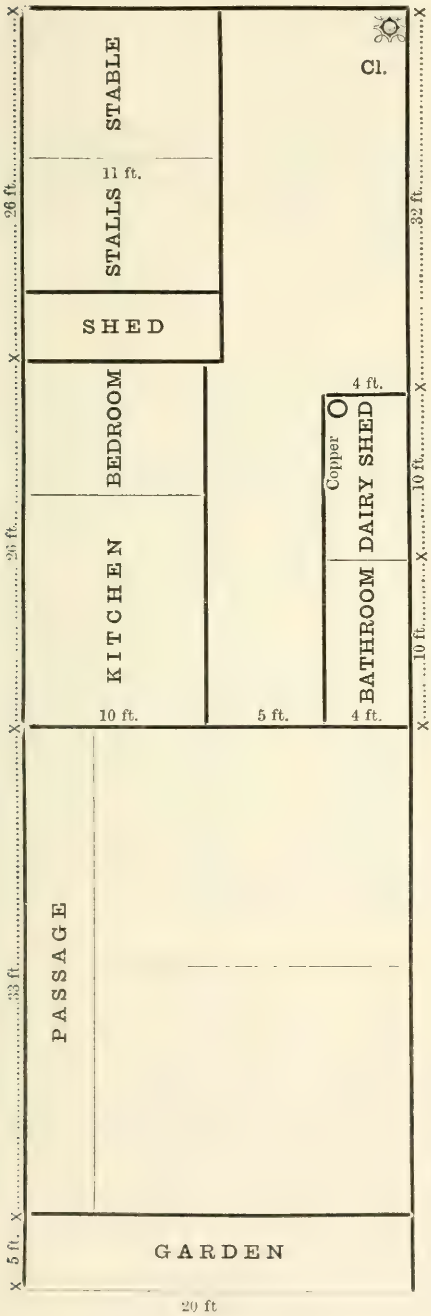
Typhoid in the Milkman's Family.

There was then an interval until the middle of March, when a new case occurred in Jolimont Place, in the house (marked M. in the street plan of Jolimont) occupied by a milkman named M., and situated three doors west of that in which the disease first appeared, in the previous November. I was informed, by a resident in Jolimont, that the very worst rubbish was deposited on the tip just opposite these houses.

M.'s elder son, a schoolmaster, returned home from New Zealand early in January 1879. He took no part in the dairy business. On the 16th of March, he fell sick, the prominent symptoms at the outset being rheumatoid pains in the trunk and limbs. But the disease rapidly developed, and on the 21st, was diagnosed beyond a doubt to be severe typhoid fever. *During this period of five days, no disinfectants whatever were employed.* Subsequently there was diarrhœa from time to time, and disinfectants were freely used in the bed-pan, and with the excreta after removal. On the pathway of the lane, behind the house, a barrow was kept, containing stable manure and earth. Into this the bed-pan was emptied directly after use, the dejecta being covered with earth. Finally, the barrow was wheeled away, and its contents buried in the tip. The disease ended fatally on the 2nd of April. The father always took a large share in the nursing.

The house itself stands on an allotment 90 feet deep, with a frontage of 20 feet to Jolimont Place. In front is a strip of garden 5 feet deep; then the main buildings 33 feet deep, and occupying the whole width of the allotment. Behind them, on one side is the kitchen and a bedroom, together 26 feet deep by 10 feet wide, succeeded by a shed for fodder, &c., cattle stalls and stables, reaching to the boundary fence at the rear. On the other side, behind the house, was a bathroom, 10 feet by 4 feet, followed by an open dairy shed of about the same size, in which stood a 20-gallon boiler. The yard was thus about 32 feet by 9 feet, with a narrow passage about 20 feet by 5 feet, extending up to the house between the outbuildings; it was paved throughout with square stone pitchers; in the corner was a dry pan closet.

PLAN OF M.'S PREMISES.



Concerning the cleanliness of the yard, the evidence is conflicting. M. said it was washed out daily, except on Sundays; but several residents in Jolimont informed me that they were forced to discontinue taking milk from M., on account of the filthiness of the yard, and of the lane behind it.

The son, affected with typhoid, lay at first in a back room next to the bath; but when the nature of the disease became manifest, he was moved into the large front room, and the door and windows were kept freely open. The stench from the tip was then "a perfect nuisance," and the sickroom swarmed with flies, which were killed and removed "almost by bucketfuls."

The Milk Supply.

M. had two carts used in the distribution of milk; one stood every night in the yard ready for the early morning start, the other was kept in the lane behind, against the stable wall. He always attended himself to the cleansing of the cans, and there was a general testimony from the customers that the milk kept extremely well. Every night the cans were scoured with a brush, and a scalding solution of soda, which was allowed to remain some time in the vessels. They were then washed with hot water, and dried with a cloth wrung out of the boiling water. The only water used was Yan Yean, which was heated in the boiler that stood in the dairy-shed. The cloths and brushes used to clean the cans were kept on a bench in the dairy-shed. *Thus, all the cans were subjected to the same treatment, being manipulated by a person who was taking a large share in nursing a patient suffering from typhoid fever.* Thus cleansed, the cans were left during the night, either in the cart within the yard, or in the shed beside the boiler.

The customers in Jolimont were supplied with milk obtained from cows kept at Jolimont. All other customers, with one or two exceptions, received milk from a dairy at Croxton Park. Thus, the business was twofold; Mrs. M. taking charge of the Jolimont trade, Mr. M. of the Melbourne and East Melbourne rounds. But, as above stated, *all the cans were treated alike by M. himself.*

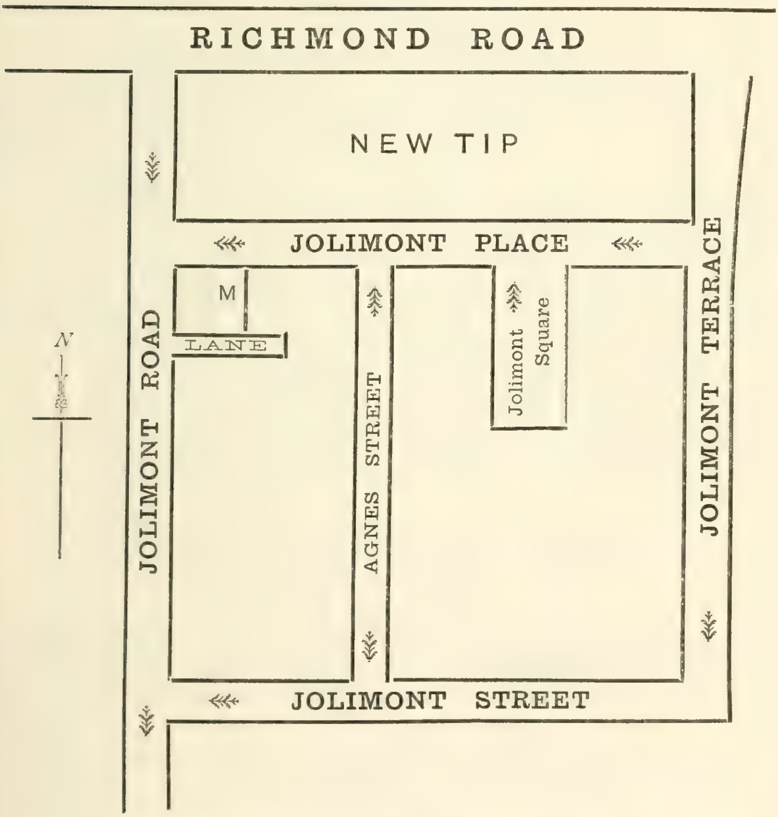
The Jolimont Milk Supply and Fever connected with it.

At the time of the outbreak of fever, M. kept six cows at Jolimont, which were not, however, in full milking. They depastured in a paddock across the railway, adjacent to the large Corporation tip; here there was then no proper drinking trough, and the cattle used to drink the impure water lying in hollows in the paddock and in the drains. There is also evidence that at night these cows were accustomed to roam over the new tip, and rummage among the garbage there deposited. During the day they came to the yard of M.'s house, and were there milked at once, the milk being immediately sent to the customers in five and seven-quart serving cans. This milk, according to M.'s statement, was never taken within the house. No settled round was pursued in its distribution

—different persons carried it on different days, sometimes M.'s daughter, or the wife, or one of the servants. There was never any surplus.

Mrs. M. supplied thirty-one (31) families in Jolimont; of these eleven (11) were visited by typhoid fever between the 23rd March (one week after the commencement of the case in her own house) and the 5th of May. In these eleven households, twenty individuals were seized upon by the disease, and three died. In a twelfth family, during the same period, two cases of "febricula" occurred, of about a week's duration. *During this period, the fever did not attack a single individual in Jolimont who did not drink the milk in question.* One family as a rule obtained milk from another source, but took milk from Mrs. M. once, about March 21, when young M.'s illness was declaring itself. The servant drank half a cupful of this milk; a week later she was laid up with typhoid fever.

STREET PLAN OF JOLIMONT.



If we compare the different streets in Jolimont with one another, very striking peculiarities present themselves in the prevalence of

typhoid among the customers of Mrs. M., as is shown by the following table :—

Statistics of Households and Individuals Supplied with M.'s Milk.

Street.	Aspect of Jolimont.	Number Supplied.		Number Visited by Typhoid Fever.	
		Households.	Individuals.	Households.	Individuals.
Jolimont Place ..	North ..	5	26	2	2
Jolimont Terrace ..	East ..	6	33	2 (*a*)	5
Jolimont Square ..	North ..	3	32	2	4
Agnes Street ..	Centre ..	9 (*b*)	44 (*b*)	5 (*b*)	9 (*b*)
Jolimont Road ..	West ..	5	30	0	0
Jolimont Street ..	South ..	3	14	0	0
Total ..	..	31	179	11	20

(*a*) One of these two houses, in which four cases occurred, is at the corner of Jolimont Terrace and Jolimont Place.

(*b*) This includes the family in which M.'s milk was taken only once, a week before the servant showed signs of typhoid fever.

Thus it is seen, that the high and comparatively well-drained parts of Jolimont were visited by the disease, while the two low-lying streets on the south and west, which receive the drainage from the higher ground, escaped entirely. It is difficult, to explain this immunity; in only one house in these two streets was M.'s milk scalded, and there only on very hot days. But it may be remarked that these two streets are farthest from the new tip, which seems to have been the great sanitary blot of the district.

Thus ten cases occurred in Jolimont Place and Square, and the adjoining corner of the Terrace, which all abut directly on the new tip. Of the remaining ten, nine were in Agnes Street, which is more or less built in on both sides, comparatively shut in, and which leads southward from the centre of the tip. The other case was a weakly lad in Jolimont Terrace, who drank a pint of the raw milk daily.

The next point to consider in the development of this outbreak is, the number of cases of fever that occurred weekly in Jolimont, after young M. fell ill on March 16. Disinfectants were first ordered to be used on the 21st.

Weekly Number of Cases of Typhoid in Jolimont, after March 16, 1879.

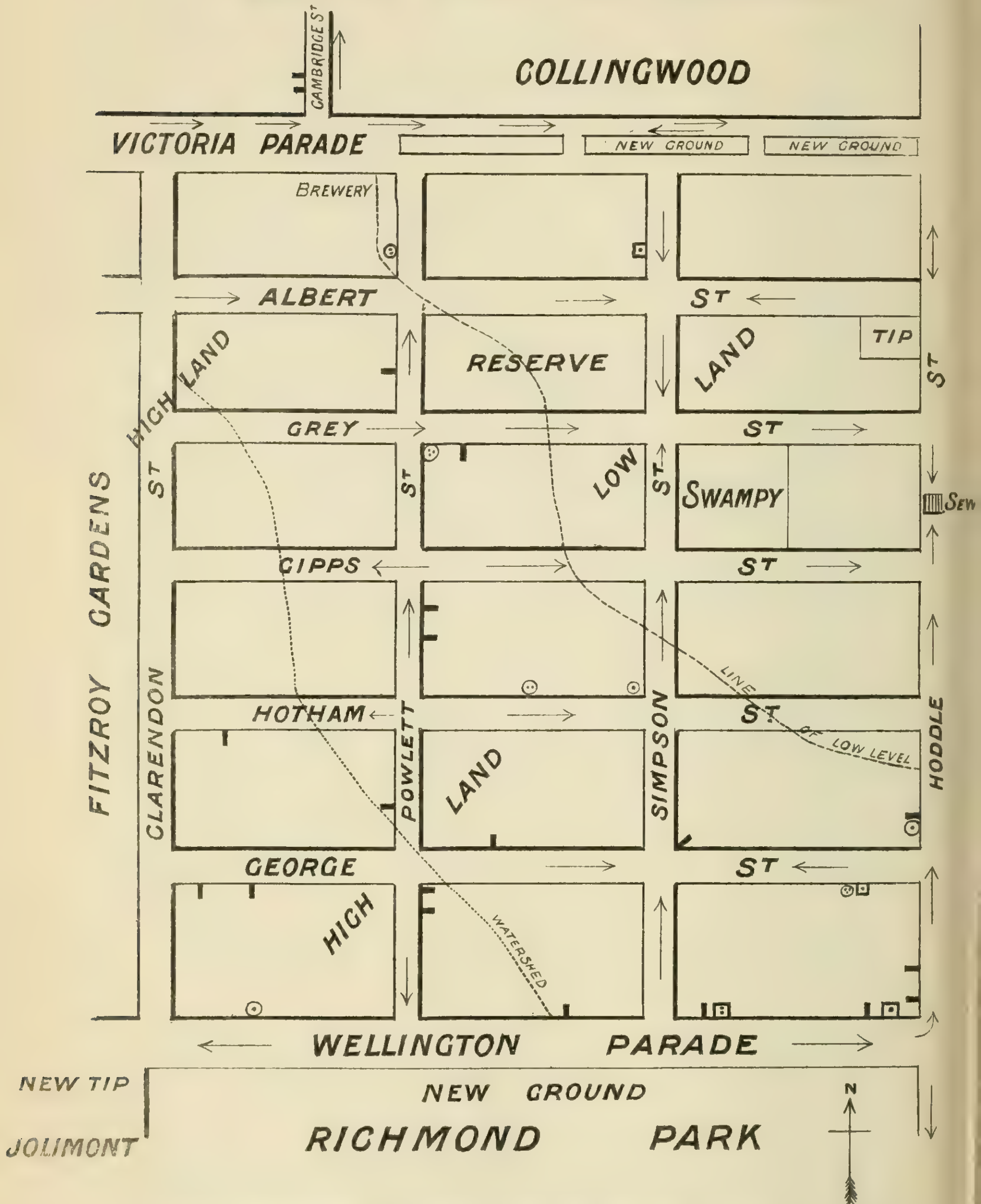
From March 16 to March 23.	From March 23 to March 30.	From March 30 to April 6.	From April 6 to April 13.	From April 13 to April 20.	From April 20 to April 27.	From April 27 to May 4.	From May 4 to May 11.
—	4	7	5 (*a*)	3	—	—	1 (*b*)

(*a*) And two cases of febricula.

(*b*) This occurred on May 5, in a house adjoining another in which an earlier case commenced on April 7.

More than seventeen persons, who had been drinking this milk, scattered during the time of the outbreak—some to England, some to

MAP OF EAST MELBOURNE.



NOTE.—Every mark | indicates a house supplied with M.'s milk. A circle O indicates a house supplied by M., in which typhoid occurred. A square □ indicates a house, not supplied by M., in which typhoid occurred. The number of dots in the circle or square indicates the number of cases.

different places through the Colony. Five of the latter had typhoid fever while away ; but I could not learn that any of the five communicated the disease to others.

Typhoid Fever among persons, outside Jolimont, supplied with M.'s Milk.

The milk supplied by M. to persons living outside Jolimont was obtained from a dairy in Croxton Park ; the dairy establishment itself seemed to be well conducted ; the grazing paddocks around it adjoined a slaughter-house in the park ; the drainage from the slaughter-house ran, at least partly, into one of these paddocks. On an average, M. took about 150 quarts of milk daily from this dairy. He left Jolimont early every morning, in the cart which had been standing all night in the yard, and took with him the cans which had been cleansed the evening before, and which were kept during the night either in the scalding-shed next the boiler, or in the cart, ready for the morning journey. After obtaining his supply of milk, M. returned through Northcote and Collingwood, to the corner of Gore and Gertrude streets, Fitzroy, where he met his other cart, which stood during the night in the lane behind his house at Jolimont, and which was driven by his second son, or by a serving lad. One or two cans of milk were then transferred to this cart, which supplied the customers in East Melbourne and a few in Cambridge Street (Collingwood), and the adjacent parts. M. himself drove on through the Eastern Hill into Melbourne. If the Croxton Park milk ran short, he bought more from shops or from other dairymen, but never obtained any from Jolimont ; usually, however, he had a slight surplus.

In Collingwood, Fitzroy, and the Eastern Hill, 13 households, comprising 96 individuals, were supplied by one or other of these carts ; *and all these families, which were the first to receive the milk, escaped with impunity.* These 13 houses were not in the vicinity of any large collections of decomposing organic matter, though the drainage around them in some instances was imperfect.

Typhoid in East Melbourne.

In East Melbourne, 26 families, including 184 individuals, drank of this milk. Among these, 13 persons in 7 families sickened with typhoid fever. I heard also of a " suspicious attack " in another case.

If East Melbourne be divided by a diagonal line running from the north-west to the south-east corner, the great majority of M.'s customers resided in the south-west division—that next to Jolimont. Almost all the cases of fever were in houses close to the diagonal line where the land is sloping downwards to the low level. The families living in the highest part of East Melbourne escaped, with one exception. I made many enquiries concerning the existence of typhoid fever among families in East Melbourne who obtained milk from other sources, but discovered only five cases in four households, supplied by as many different milkmen.

M.'s Melbourne Supply.

Between Spring and Swanston Streets, on the east and west, and Bourke and Flinders Street, on the north and south, M. supplied

13 households, numbering 123 individuals; of these, 10 persons in 5 households sickened with typhoid fever. Eight of the 10 cases occurred in Collins Street East, and 2 in Bourke Street.

But on the other hand, west of Swanston Street, 10 households, including 73 individuals, received similar milk during the same round, and yet escaped with complete impunity. In this same district, M.'s milk was also used in the open luncheon and dining rooms attached to two hotels, at which I was informed by the proprietors that about 120 persons partook of unscalded milk in some form or other daily, though of course in very small quantity; no cases of fever were known to have occurred.

General Statistics.

Gathering together the facts recorded concerning the prevalence of typhoid fever among M.'s customers in all these districts, we obtain the following results:—

Statistics of Fever among all M.'s Customers.

District.	Number Supplied		Number Affected		Percentage Affected.	
	Households.	Individuals.	Households.	Individuals.	Households.	Individuals.
Collingwood, Fitzroy, &c. ..	13	96	0	0	nil.	nil.
East Melbourne	26	184	7	13	26·9	7·06
Melbourne, East of Swanston St.	13	123	5	10	38·46	8·13
Melbourne, West of Swanston St.	10	73	0	0	nil.	nil.
Total outside Jolimont ..	62	476	12	23	19·35	4·83
Jolimont, except J. Road & St. ..	23	135	11	20	47·8	14·81
Jolimont Road & Street ..	8	44	0	0	nil.	nil.
Total in Jolimont	31	179	11	20	35·48	11·17
Grand Total	93	655	23	43	24·73	6·56

Weekly Numbers of Cases of Typhoid among M.'s Customers.

	From Mar. 16 to Mar. 23	From Mar. 23 to Mar. 30	From Mar. 30 to April 6	From April 6 to April 13	From April 13 to April 20	From April 20 to April 27	From April 27 to May 4	From May 4 to May 11	From May 11 to May 18
Jolimont ..	0	4	7	5 (*a*)	3	0	0	1 (*c*)	0
Melbourne ..	0	1	3	2	1	2 (*b*)	0	1 (*d*)	0
East Melbourne..	0	1	2	4	6	0	0	0	0
Total ..	0	6	12	11	10	2	0	2	0

(*a*) And two cases of febricula.

(*b*) Three cases of typhoid commenced this week in Collins Street East, in a family not supplied with M.'s milk.

(*c*) Beginning in May 5 in a house adjoining one in which an earlier case commence l on April 7.

(*d*) Beginning on May 10 in a house in which there had been two previous cases.

It will be remembered that young M.'s illness was first noticed on March 16, and that he died on April 2.

Climatological Conditions.

The most notable fact in the climatic conditions of Melbourne, during the early months of 1879, was the high temperature of the surface soil, as shown in the following table compiled from the records of the Melbourne Observatory :—

Mean Temperature of Surface Soil.

January	—81·8°, or 4·1° above	average	for	January
February	—79·0°, or 3·8° ,,	,,	,,	February
March	—72·9°, or 2·7° ,,	,,	,,	March
April	—63·9°, or 2·5° ,,	,,	,,	April
May	—51·6°, or 2·0° below	,,	,,	May

Rain fell on six days in March, ten in April, and fifteen in May, the falls for these months being respectively 0·43, 1·49, and 2·21 inches.

The temperatures registered in the shade during these months were :—

March—mean	63·2°, maximum	95·2°
April — ,,	59·9° ,,	88·0°
May — ,,	51·4° ,,	68·6°

The main questions involved in the enquiry into this outbreak of typhoid fever may now be considered seriatim :—

(1) *Was contaminated milk the cause of the outbreak?* The answer to this must be an unquestionable affirmative; cases of fever occurred in 23 out of 93 families supplied with this milk; the disease appeared suddenly among the customers a week after the primary case commenced its course in the house of the milkman M. The outbreak quickly reached its greatest degree of prevalence, and as quickly subsided.

(2) *What was the nature, and what the method of this contamination?* Two explanations were offered; one, that the milk was poisoned through the cows drinking foul water, and feeding on the decaying vegetable rubbish found in the tip. Two objections to this arise at once :—firstly, cows belonging to other dairymen depastured in the same paddocks, and drank similar water, while the milk yielded by them did not induce fever; and secondly, the milk obtained by M. from Croxton Park induced fever, just as did Jolimont milk, though not in so large a proportion of the individuals supplied.

The milk being thus derived from two distinct sources, and yet carrying the same virus with it, whencesoever it was obtained, we are driven for an explanation to the milkman himself and his cans. As before remarked, "all the cans were subjected to the same treatment, being manipulated by a person who was taking a large share in nursing a patient suffering from typhoid fever." These cans stood all night within ten to fifteen yards of a barrow containing a mixture of earth, stable manure, and typhoid stools, to which was added from time to time (so I was told) some disinfectant solution; similar solution was used also in the bed pan itself, but none of these precautionary measures were adopted during the first five or six days of the patient's illness.

It is noteworthy that, while the fever poison was being distributed, the milk that conveyed it kept sweet for days. The cleansing of cans with soda, hot water, &c., may prevent milk from swiftly turning sour, but will not destroy the typhoid virus; nay more, this virus may possibly be introduced into the cans in the very operation of cleansing, scrubbing, and wiping them.

As far as I could judge, it mattered little who served the milk to the customers, or what had been the closeness of his or her connection with the sick room. But the evidence in this respect is very incomplete.

The condition of M.'s house and yard is the subject of many conflicting statements ; probably care in many things was accompanied at times by neglect of others. Thus, though M. could assure me that the cans which he used never entered the house, yet he was unable to speak with certainty about the cans and milk used in the Jolimont supply. He was aware that in some instances his orders, "never to supply cold milk to anyone," had been disregarded.

The Jolimont customers, in fact, ran many risks peculiar to themselves ; the cans used in supplying them were more constantly near, *perhaps in*, the house ; the cows were frequently milked by persons engaged in nursing a typhoid fever patient ; the distribution of the milk was less methodical, and altogether the work was done in a slipshod way.

(3) *Was the milk thus contaminated able to produce typhoid fever in those who drank it, in the absence of certain other conditions ; if not, what were these conditions ?* The limitation of the outbreak among M.'s customers to certain definite districts shows clearly that the first part of this question must be answered in the negative. The same milk being supplied in the same daily rounds, typhoid fever prevailed extensively in some quarters, and was entirely absent in others. No individual or family predisposition can explain this away. Defects of drainage or of ventilation in single houses will not touch the point at issue ; it is idle to suppose that there were grave sanitary defects in all the houses of M.'s customers into which typhoid entered, in East Melbourne and in the eastern half of Melbourne proper, while all the fever-free houses in West Melbourne, Fitzroy, Collingwood, &c., were in such matters without reproach. No, we must look for conditions affecting *districts*, and not merely *single dwellings*. The problem presented is one of the utmost difficulty, yet the facts seem to show that, apart from some localising conditions, the poisoned milk would not, unless in exceptional cases, produce an outbreak of fever ; and even when these conditions were present, personal and family peculiarities, age, drainage and ventilation of special houses, &c., would be most important factors.

I can only guess the nature of the localising conditions. Nearness to offensive tips for rubbish appeared to be the most potent factor in Jolimont. In East Melbourne, proximity to low-lying, badly drained ground seemed the chief condition common to almost all the houses invaded. Of the different incidence of the fever in the eastern and western halves of Melbourne city, I can offer no explanation. In regard to the milk obtained from Croxton Park, it is extremely strange that the families first supplied in Clifton Hill and Collingwood should go free, that the families next visited in East Melbourne and the eastern half of Melbourne should suffer in so many instances, and that the customers in the western part of Melbourne should enjoy immunity. I do not feel justified in taking up your time with vague speculations, but simply place the facts before you, hoping that, in any future outbreaks, investigators will not be content when they have convicted milk of being the carrier of contagium, but will closely study the conditions which govern the prevalence of the fever among the families and individuals supplied with the contaminated milk.

TYPHOID FEVER—HISTORY OF AN EPIDEMIC.

By A. V. Henderson, M.B. et Ch.B.

An epidemic of typhoid occurred in the year 1887 in the township of Lilydale, a township composed in the greater part of hills and dales, but which, in one particular part, rather thickly studded with houses, is a large flat, undrained, and in a generally insanitary condition. Through the township runs an ever flowing creek, which contained a clear and wholesome supply of pure drinking water up to the time of its becoming tainted.

This district had been free from epidemics of this fever, although isolated cases had occurred. It was from the investigation of the sporadic cases that I gleaned, to my mind, the most valuable information.

The following are the condensed facts of the outbreak.

In January of the year 1887, there was what would be considered a drought in this district, which as a rule is well supplied with rain water, in the winter months there being rather too much rainfall. At this time the domestic supply had run very short, being in most cases supplied from underground brick tanks. The water in these tanks had become very low, and in many cases they contained only a foot or two of stagnant water. The drains, which are of the primitive type, were full of decaying and decomposing matter. In fact, the residents had everything prepared to welcome a visit from such a disease as typhoid. I speak principally of those who resided on the flat, undrained part before mentioned.

It was when this state of affairs existed that a groom, named D., came to Lilydale to recruit, as he had not been feeling well for some days. He stayed at a grocer's shop and boarding-house kept by a man named P.; not getting any better from the change, he came to consult me, when, after seeing him two or three times, I pronounced him to be suffering from typhoid fever, and ordered his removal to the hospital in Melbourne, where he was treated for enteric fever. His wife had come up in the meantime to nurse him, and began to show premonitory symptoms ; as soon as she consulted me, I advised her removal. She went to the hospital also.

Closely following on the departure of these two cases, the wife of the storekeeper took ill, but did not send for me until some time after she had felt ill, and had served groceries in the shop. All precautions possible had been taken to keep down contagion, but the harm seemed to have been done. One of the children (belonging to the boarding-house keeper) then contracted the fever, and in quick succession arose other cases in this house and outside.

The next door neighbours—who lived right upon the creek—were the subsequent victims. Their child, who had been accustomed to play with the boarding-house keeper's children, being affected first ; this being the probable source of contagion between these two families.

It was from this house upon the creek that a great deal of the subsequent mischief arose. I found out, when called into this house, that it was the custom of the occupants to throw most of their refuse into the creek, and as the bedroom doors abutted on to its banks, most of the excreta would find its way into the water. It was some time after

this child had been ill that I was called in, so that the mischief had been done.

All along the same side of the street as the store arose a number of cases, almost every house holding a victim. As the creek water was now affected, and as numbers of the people had been to the creek for a supply, how far these subsequent cases were due to neighbourly intercourse, or to the creek water, it would be hard to say. All along the banks of the creek below stream (not above it) the residents contracted the fever, and all of these drank from its waters. The navvies working on the new line of railway from Lilydale to Healesville, whose tents were pitched on its banks, also suffered severely.

In a different situation to all these cases in the township, and where the creek water was not used, I was surprised to find typhoid had begun with another series of cases, but soon learnt that they arose from a case which had left the house on the creek. A mother, Mrs. W., a widow, had taken her little girl away from here, on learning that typhoid fever was in the house, and had taken her to this part of the township, but too late, as she soon showed symptoms, and was treated by the mother for some time, until fever symptoms set in, which prompted her to apply to me.

The next door neighbour who used to run in, and help to nurse the little girl, not knowing what the disease was, and what precaution to take, as can readily be understood, contracted the fever, and from them again their relatives and friends. Thus the disease took full possession of the township, whose general system of drainage and sanitary condition favoured its spread. And so the succession of cases all originated from the one imported case, the virus acting quickly in constitutions rendered liable to its action by the predisposing causes then existing.

This epidemic shows how a running creek can be contaminated by the excreta from a typhoid patient, and carry the germs far and wide to numbers of unsuspecting people. Many more than the number which came under my personal care must have suffered from drinking its water, and gone away to their homes, or to the hospital.

Thus, if a running creek, in a country district, can be polluted to such an extent by one case, how much more easily can a reservoir be contaminated, and how many more lives can this reservoir then endanger. With what extreme care then should the domestic supply of a large community be guarded, or what dire results may follow. The illustrations I have just given point to the moral, and the same would apply to sanitary conditions. For suppose a dwelling-house to be situated near a reservoir, at a higher level than its banks, and suppose an unsuspected case of typhoid came to this dwelling, what is to prevent the contamination of that reservoir? Hence the injudiciousness of having near any domestic water supply, dwellings of any kind.

Now, as to sporadic or isolated cases of typhoid fever. I had collected and investigated a great many cases, out of which I preserved a few typical ones. I mention here only three or four cases. From these, I have been led to this belief: "That in most sporadic or isolated cases, the original cause of the fever lies in the virus generated in stagnant decomposing water." The first case is this :—

A young man, about 23 years of age, named H., who resided about seven miles away from Lilydale, and whom I visited professionally, was

suffering from a typical case of typhoid fever. On making the usual inquiries and investigations, I found the house situated on rising ground in a pretty locality, the drainage was very good, privy clean, and all sanitary conditions of the best. The young man was building a house at the time he fell ill, intending to get married and live in it with his wife as soon as finished. He worked by himself, had not been away from home for six weeks, had had all his goods in from a place called Wandin for some time previous to this ; and his mother, whom he lived with, had not been away from home, neither had they seen anyone. On asking questions about the water used for domestic purposes, I found they had run out, and were getting their supply from a tank close by, which was not used, and which was very low as to the depth of water it contained.

On examining this fluid, I found it was dirty, had a nasty decomposing smell, and was full of animalculæ. The patient said he often felt sick for some time after drinking it, but he was obliged to use it, as it was hot weather, and he being busy had no time to go farther for better.

In this case I could find no other cause, after fully investigating all conditions, and therefore came to the conclusion that this case of typhoid originated from the stagnant degenerated water which the patient had indulged in. And given one case, where is the contagion to stop in such a communicable disease, providing the surrounding circumstances are favourable? In this case, everything was isolated. It was a country farm residence, with no houses near, being built upon a farm of a considerable number of acres.

In the other case, a young man, named J., aged 19, who lived about 9 miles from Lilydale (in the country), came in to consult me, and having ascertained clearly that his sickness was typhoid, I recommended his removal to the hospital, where he was treated for such. I made all inquiries, and found that he had not been to Lilydale, and that when he left home it was to go in the opposite direction ; and as that had been only once for a considerable time, he could vouch for the fact that he had not met anyone, except to exchange a passing salutation. The water this patient drank was in a somewhat similar condition to the previous case, and the other sanitary conditions were very good. I could come to no other conclusion than that which I arrived at in the first case cited.

The next cases occurred in a family living 12 miles away from Lilydale. All enquiries led to the same results. Three of the family contracted typhoid. They had not left their homes for some weeks previously, and everything pointed to the domestic water as the primary cause.

In the year 1885 a young fellow, W. B., aged 21, working at Mitchell's lime kiln, took ill at his home and sent for me ; he developed a typical case of typhoid. The house he was living in with his mother, father, and brother, was fairly well drained. The water used for domestic purposes seemed good, and as he had not mixed in any way with people from Melbourne, or had been there on a visit, I could not account for his contracting the fever, until I learnt he remembered that some days previously, having felt thirsty after working hard on a hot day, he had taken a drink from a stagnant pool of water in one of the paddocks, which he passed through on his way home.

I saw this case early, and kept him well isolated, and used all precautions with the excreta, in which I was helped by his parents. His brother, who was in the same house and used to nurse him, took the fever, and was sent to the hospital, but these were the only two cases which occurred that year in Lilydale.

I took all possible care in collecting information and investigating these cases, in all of which I was forced to come to the same conclusion.

What the constitution of the germ or poison is, I do not pretend to state, but only that in the stagnation and decomposition of water a virus is generated, which is capable of causing typhoid fever in the human system.

It is noticeable that most cases arise after a drought, and the greater the duration of that, the greater the number of sporadic cases.

Dr. Murchison held the opinion that typhoid fever was the result of putrefaction, having called it pythogenetic, or fever born of putrescence. If he would consider water in a state of stagnation, and consequent decomposition, as putrescent, then the result of my investigations would correspond with his.

It was for these reasons that in my report to the Central Board of Health I recommended the boiling and filtration of water, heat being the best destroyer of the virus.

These precautions I had practised in Lilydale (by the residents), the year following the epidemic, and I found that though a good number of cases arose, not one occurred in which these precautions had been taken with the water supply, and in those cases which arose, there was total neglect of such ; in fact, disregard towards the domestic supply of water in country places is great, and it is not uncommon to find that underground tanks have not been cleaned out for years.

In country districts investigations are more easily carried out, and sporadic cases are far apart, giving greater facilities to glean information, and all the attendant difficulties which arise in thickly populated towns are lessened.

A NOTE ON THE INCUBATION PERIOD OF ENTERIC FEVER.

By Jos. C. Verco, M.D. Lond.

Joint Lecturer on Medicine at the University of Adelaide. Hon. Physician at the Adelaide Hospital, &c.

The patient, a young man, was first seen by me in private practice at his home on May 1st, 1888. He had come from Broken Hill, N.S.W., the same day, where he had been ailing for about a week. He was feverish. On May 4th he developed typhoid roseola, had an unusually abundant eruption of spots in a few days, and passed without unfavourable symptoms through a typical attack of enteric fever.

On the morning of May 17, one of the servant girls, who had been complaining of headache and general malaise for a day or two, was seen. Her temperature was normal, but she was sent to bed. At night, the thermometer registered 100·4°, the next morning 101°, in the evening

101°, the following morning 100·4°, and in the afternoon above 102°. On the 19th, she was sent to the Adelaide Hospital, where she developed undoubted typhoid, with abundant spots, and with a continued fever, lasting until June 7th, the first occasion on which the night temperature was normal.

On May 21st, I saw the other servant girl, and learned that she began to have headache on the 18th of May, followed by stiffness of the neck. She was feverish, and was sent to the Adelaide Hospital on May 22nd, where she had an attack of enteric, the pyrexia disappearing at night for the first time on June 15th.

There had been no case of typhoid in this house since Dec. 1886, sixteen months before. At that time, one of the sons came down from Teetulpa Goldfields, where he had contracted the fever. Within three weeks of the arrival of the patient from Broken Hill, both the servants were affected. There can be very little doubt, therefore, that they contracted the complaint from the recent arrival, and not from any germs derived from the more remote case.

The usual precautions were taken, in reference to disinfection with carbolic acid of all clothing and evacuations, but it appears that while the nurses were at their breakfast, the serving girls relieved them at the bedside, and watched the patient, and one of them had washed the patient's linen after soaking in carbolic acid solution. But however contracted, it certainly was communicated; and so its contagious nature is established, contrary to the opinion of some.

The period of its incubation is, to some extent, fixed for us. Within fifteen days from the entry of the patient into the house, the first girl began to grow ill, and within seventeen days the second one. If, therefore, infection took place on the first day of his arrival, the incubation period would only be a fortnight or sixteen days. It *could not possibly have been longer* in these two cases. And inasmuch as it is not probable they were infected quite so soon as the first day, the incubation period for both of them was most likely *under two weeks.*

NOTES ON TYPHOID FEVER.

By J. W. Springthorpe, M.A., M.D. Melb., M.R.C.P., Lond.

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The following is the statistical account of the cases of typhoid fever under my care in the hospital during the past season :—

No. of Cases.	Males.	Females.	Ages.	Duration of Fever.	Relapses.	Deaths.
84	62	22	Between 10 & 20–24 " 20 & 30–53 " 30 & 40–7	Average 26 days	11	13

48 of the cases were admitted in January, February, and March, and 18 within the next three months. In 27 cases, constipation was marked ;

in 37, diarrhœa was severe; in 16, the temperature rose above 105° 1 had four relapses; spots were found in about half the cases; in 10, hæmorrhage occurred; 6 had pneumonic attacks; in 3, there was peri-typhlitis; in 3, thrombosis of the left leg; in 6, perforation; in 4, pregnancy, the 2 in the early months aborting; in 1, there was left hemiplegia; in 1, parotiditis; and in 1, multiple pulmonary hæmorrhage. One had had a previous attack. The causes of death were—perforation in 6, hæmorrhage and exhaustion in 2, pulmonary complication in 3, hyper-pyrexia and cardiac failure, each 1. Four cases were moribund on admission. There is nothing new to add regarding treatment, except that antipyrin, in single doses of 15 grains, was found very useful when the temperature remained high after cold sponging and ordinary diaphoretics, and that nepenthe (m. xv.) taken at night saved several lives, when there was delirium and diarrhœa, the succ. eucalypt. rostr. ʒj being a useful addition.

Regarding the incubation period. On several occasions, a crop of fresh cases was noted in from two to three weeks after a rainfall.

As to diagnosis.—Difficulties were found in cases of tuberculosis, tubercular meningitis, gastro-enteritis, and the gastro-intestinal form of influenza. Cases of the three first were differentiated upon well recognised general grounds. No doubt many cases are called typhoid, especially amongst children, which are better classed under gastro-enteritis.

An investigation into the influenza epidemic has led me to the conclusion that there is a form of continued fever existent amongst us, influenzal in origin, yet simulating typhoid fever in many particulars. I have seen some dozen cases in which typhoid fever was so simulated, and some three in which an exact diagnosis is open to dispute. At present cases are coming into the hospital of an anomalous character, they are not the ordinary typhoid; my cases of such I can class as gastro-intestinal forms of influenza. Some cases may be explained as true typhoid supervening after an influenzal attack. Some have developed an influenza sore throat after the typhoid has begun, but the majority are quite distinct. The points in the differential diagnosis are as follows:—In the influenzal class the incubation period is found to be short, the onset sudden, the patient generally hepatic. There has been influenza in the same house; there is a history of an influenza attack in the patient, and examination of the throat will show the naso-pharyngeal catarrh, the sticky adherent mucus, the rounded hillocks, or the ulcers or sloughs characteristic of the disease. There is pyrexia, like that of typhoid in height and continuance, but generally coming down within ten days. Profuse sweating from the outset, and marked prostration are seldom if ever absent. Instead of the suffused heavy face, the apathy, the delirium, the dry brown tongue, we have face and expression natural, intellect unimpaired, tongue coated, and no epistaxis. There are no spots or tympanitis. Constipation is present at first, possibly with local pains, in some cases suggesting sub-acute rheumatism; and when diarrhœa occurs, the stools are those of milk diet, not "pea soup," the light colour alternating with darker, the watery character being at times replaced by the natural consistence. Some cases continue indefinitely a puzzle to their attendants, and end in sloughing of the mucous coat of portion of the alimentary canal, with or without the

supervention of pulmonary or intestinal tubercular mischief. In the milder cases, however, the after history is further evidence of their non-typhoid character. The patient can be got up and placed on ordinary diet at a time when the attempt would have almost inevitably produced a relapse in an ordinary typhoid case. Finally, cases of this sort were noticed and satisfactorily accounted for at a time when the onus of proof was, not to prove the case non-typhoid in character, but the reverse. During December, however, many fresh cases have arisen, wherein the onus has been to prove them non-typhoid; and by applying the differential diagnosis already arrived at, a separation of cases has been possible, and one which, in my judgment, is based upon a real difference in etiology and pathology. The nature of the lesion, and its *modus operandi* in typhoid fever, are known to all; the lesion and substratum of influenza are discussed in another paper.

NOTES ON VARIATIONS IN THE PATHOLOGICAL PROCESS IN TYPHOID FEVER.

By H. B. Allen, M.D.

Professor of Anatomy and Pathology in the University of Melbourne.

The incubation of typhoid fever is sometimes accompanied by intense depression, the pulse being abnormally slow and very compressible. This depression may pass off, to some extent, with the development of the fever, but it sometimes persists, and must largely govern the treatment. Even when strongly marked, it is not necessarily followed by a severe attack.

The usual insidious commencement of typhoid is sometimes replaced by a sudden onset, with vomiting and purging, and other symptoms of gastro-intestinal irritation, so that the case may resemble one of irritant poisoning. The precise cause of these phenomena is not, so far as I am aware, clearly ascertained.

In some cases, the fever runs a short typical course. Probably the swollen follicles of the agminated glands slough separately, the patches acquiring a finely-pitted appearance (*plaques à surface réticulée*), and rapidly healing. In other cases, after death, patches are found in all stages, some ulcers being thoroughly cleaned, with bases formed by the circular muscular fibres; others, higher up the bowel, being coated with sloughs in process of separation; while others are still swollen and purple. These are not cases of relapse, properly so-called, but of successive poisoning of separate patches. They are found in most patients who die after prolonged fever. I believe that a dose of calomel, given during the first week, before the sloughs are fully formed, does much to prevent this successive invasion of patches.

In the pathological theatre, the varying extent of ulceration is very striking. There may be but a single ulcer; yet this may be deep, may be accompanied with high fever, and may finally undergo perforation. On the other hand, the agminated glands may be very generally

affected ; and when a large surface is thus implicated, although the patches are simply tumid and angry red, the shock to the system may, in some degree, resemble that of an extensive burn. The solitary glands are sometimes little affected when Peyer's patches are deeply ulcerated.

The intensity of the intestinal lesion is even more variable. In fatal cases, there may be nothing more than intumescence and pitting of a number of patches. But, at the other extreme, there may be rapid and great swelling of the solitary and agminated glands, followed by deep sloughing. The inflammatory accumulation of cells in the lymphoid tissues may not be limited to the follicles, but may be general throughout the mucous membrane of the affected area. Such general tumefaction is, I believe, an occurrence of very grave import. When the intestinal lesions develope in this rapid intense fashion, the mesenteric glands also become so choked by aggregation of leucocytes, that caseous infarction may ensue. This acute infarction differs greatly from the slower, more bloodless caseation seen in tubercular processes. In other rarer cases, the mesenteric glands undergo suppuration or sloughing.

The perforations which occur in the agminated glands are of two kinds—firstly, there is the pin-hole perforation, a minute rounded aperture at the bottom of a shelving ulcer ; and secondly, larger, more irregular perforations following sloughing of the floor of the ulcers. The pin-hole perforation results from the depth of the original sloughing ; it seldom occurs in more than one patch. The large perforations are not due to the separation of the primary sloughs, and to molecular changes consequent thereupon, but to later processes of secondary sloughing, probably induced by the ingestion of biscuits, apples, or other improper articles of diet. The pin-hole perforation, therefore, forms much more slowly ; it is not preceded by marked symptoms of irritation ; the intestinal contents cannot escape so freely into the peritoneal cavity, and what little does escape is sometimes encapsuled by inflammatory adhesions. Perforation due to secondary sloughing is not infrequently multiple. These points have a bearing on the possibility of surgical interference.

The degree, in which the large intestine is implicated, varies greatly. In some cases, the large bowel escapes altogether ; in others, the lesions are confined to the cæcum ; in others, they extend throughout part or all of the colon, even into the rectum. In certain cases, I have found death caused by hæmorrhage from ulcers in the cæcum or colon. The vermiform appendix is often affected, as might be expected, seeing that its inner surface is lined throughout with lymphoid follicles ; the lesions are usually limited to swelling and pitting, but I have known perforation to occur.

Clinically, relapses vary greatly ; sometimes there is a re-accession of fever for a few days, with evening exacerbations ; sometimes a complete, though short, repetition of the attack. Between these extremes, various intermediate forms occur. So also, pathologically, in relapses which prove fatal, the morbid appearances display great diversity. In many cases, the ulcers in Peyer's patches, near the ileo-cæcal valve, will be found in various stages of cicatrisation, with pigmentary deposit in the edges, while patches further removed will be intumescent, or finely pitted, or sloughing. Sometimes patches will be found, only part of which suffered in the first attack, the resulting ulcer being clean based, with

shelving edges, and having perhaps transgressed the lateral limits of the agminated gland; while in the relapse, the remainder of the gland suffers, being found swollen, with the slough still adherent. Such cases offer the most striking illustrations of the well-known fact, that the lymphoid follicles, in different parts of the small intestine, suffer very unequally. Sometimes the large intestine escapes in the first attack, but in the relapse, when the ileum is perhaps little affected, the whole length of the colon is studded with tumid or sloughing solitary glands. It is well known that typical relapses seldom prove fatal. The fatal relapses, to which I have referred, were mostly cases of re-accession of the disease during the healing of the ulcers of the first attack. Not seldom, the history of the first attack was very obscure. A phenomenon, which has not excited much attention, is *late sloughing*, occurring long after all ordinary sloughs have separated, and at a time perhaps when the ulcers are in varied stages of cicatrisation. These late sloughs may be far removed from the original ulcers. Thus I have seen large patches of sloughing, affecting all the coats of the jejunum, within a few inches of the duodenum; I have seen sloughs in the splenic and in the sigmoid flexures of the colon. Some of these appear to be neurasthenic; others commence in hæmorrhagic erosion. I incline, therefore, to connect some of these late sloughs in point of causation with other still later phenomena, which may occur during imperfect convalescence, such as necrosis of ribs, progressive dilatation of the heart, &c. These occasional evils, which snatch patients away when the grave dangers appear past, serve as a warning, that typhoid patients need watchful care for a considerable time after apparent complete recovery. When neurasthenia persists, the patient should be watched closely, for extensive lesions may develop very insidiously.

Hæmorrhage from the intestine, during typhoid fever, may be due to oozing from distended capillaries over a considerable surface, or to oozing from the angry edges and bases of ulcers, or to the opening of a considerable vessel by sloughing. In some cases there is a distinct tendency to hæmorrhage, evidenced not only by copious early epistaxis, but by pulmonary congestions, running on into hæmorrhage. In some such cases, intestinal hæmorrhage is followed by distinct improvement. The hæmorrhages resulting from high vascular tension must be distinguished from those due to depraved condition of blood, as in purpura.

Tubercular infection of typhoid ulcers has not received much notice; yet in certain years I have found several cases. Mistakes in diagnosis of such lesions can easily be made. Typhoid ulcers are frequently, in cases which have lasted five or six weeks, wider transversely than longitudinally; but this does not imply tubercular infection. Minute patches and tags of fibrin may be found on the serous surface, opposite deep ulcers, and may be mistaken for tubercles. Acute caseation of mesenteric glands in the early stage of fever should be distinguished from tubercular changes. Well-marked secondary local tuberculosis usually occurs late in the course of the fever. Many ulcers will present the characters typical of typhoid; but some, near the valve, will have somewhat thickened bases, and in the sub-peritoneal tissue opposite there will be distinct grey grains, and perhaps lines of similar grains running to the mesenteric edge. The nearest mesenteric glands may

present patches of caseation, and, at the edges of the cheesy areas, tubercles may be indistinctly visible. But, much more rarely, distinct tubercles will be seen on the peritoneal surface, opposite ulcers from which thick sloughs are only commencing to separate. I have never seen any generalisation of such tuberculosis in the peritoneum. In some cases of secondary tubercular infection during typhoid, I have found old encapsuled cheesy matter elsewhere in the body ; but in other cases, no traces of old tubercular processes were present, and the patients had been previously robust. Doubtless, the bacilli of tubercle are widely disseminated in the atmosphere. We must frequently inhale and swallow them. The issue depends largely on the presence or absence of a prepared culture bed.

I am of opinion, rightly or wrongly, that too much has been made of typhoid fever as inducing subsequent phthisis. I fancy that in many cases in which phthisis has been said to follow typhoid, the mischief has been purely tubercular from the outset. Cases of pulmonary tuberculosis, which begin acutely, not infrequently mimic typhoid. The occurrence of sweats, without corresponding fall of temperature, is sometimes a notable diagnostic symptom. But the appearance of the patient may be sufficiently characteristic.

Endocarditis is a possible complication of typhoid, which may easily be overlooked, with evil results to the patient. Cardiac thrombosis now and then occurs, with embolism in the spleen or elsewhere. Thrombosis of the iliac veins, with phlegmasia, is more frequent. I may pass by the familiar pneumonia, and barely mention the occasional occurrence of pyæmia, tetanus, &c.

No matter how severe the head symptoms attending typhoid may be, even though wild delirium occur, instead of low muttering, meningitis is not found. It is an extremely rare complication of typhoid fever. Yet, in certain seasons, head symptoms have been so prominent, that physicians have called the disease "nervous fever," as distinguished from typhoid.

I have often thought that many cases of typhoid are complicated with septicæmic poisoning, by absorption of soluble poisonous substances from the foul contents of the intestine. Still more is it borne in upon me, that a degree of uræmia is often present ; there is rapid destruction of muscular tissue, while the kidneys are more or less unfitted to discharge their full functions, by reason of the febrile state. This may explain why so many strong muscular subjects die; while slighter, more delicate, patients recover.

It is with some hesitation that I have placed these scattered notes before you. There is little that is new in them, as may be seen by comparing them with the masterly descriptions given by the late Hilton Fagge in his "Principles and Practice of Medicine." But I have not mentioned, even incidentally, a variety or a complication of the morbid process which I have not seen, and this must be my excuse for occupying your attention.

THE COLD BATH TREATMENT OF TYPHOID FEVER.

By F. E. Hare, M.B.

Resident Medical Officer, Brisbane Hospital.

Although the treatment of typhoid by cold bathing has been frequently and powerfully advocated on the Continent, it does not seem to have gained many supporters in England or the colonies. The reason for this is not far to seek. The bath has been regarded as a heroic remedy, justifiable only in desperate cases; whereas the very essence of the treatment lies in the fact that it is above all a prophylactic against the effects of continued pyrexia, and not a curative proceeding in the ordinary sense of the term. Regarded from this standpoint, it may be said to be absolutely free from risk of any kind.

Holding such views, I began the treatment at the Brisbane Hospital. Through the indulgence of the visiting staff, to whose kindness I am much indebted, I was enabled to put every patient, who was admitted on or after a certain date, upon a systematic course of cold bathing, very similar to that recommended by Brand.

I will first briefly describe the treatment in a case of ordinary severity. Should the patient not have reached the eighth day of fever, the bowels are freely moved by castor oil, or some other unirritating purgative. He is then put upon the ordinary diet of beef tea and milk, administered in regular quantities at regular intervals, with an unlimited supply of iced water to drink.

Brand's rule is observed in bathing, *i.e.*, the temperature is taken in the rectum every three hours, day and night, and whenever it reaches 102·2° F., a bath of about the temperature of 70° F. is given. The first does not exceed ten minutes in duration for an adult. The temperature is not taken while the patient is in the bath, but half-an-hour after its termination, and always in the rectum. The fall should be to 101°, or lower. Should this not be approximately attained, the next bath two and half hours later is prolonged by about five minutes, and so on. It is rarely necessary to continue the immersion for more than half-an-hour. If this be insufficient, the temperature of the bath water is lowered to 65°, or even 60° F. In most instances, the temperature only just reaches its former level by the time the next bath is due, but in a few, it rises with great rapidity, attaining its maximum in an hour and a half, or sooner. Here the frequency of the baths is increased, so that as many as twelve in the twenty-four hours may be given. Stimulants if required are given before the bath, and nourishment half an hour after its termination, when the fall of temperature is being noted. The interval is wholly devoted to sleep.

In ordinary uncomplicated cases, this treatment is carried out strictly from the day of admission, until such time as the temperature ceases to rise to 102·2° F. The approach of convalescence is seen in the gradually diminishing number of baths, so that usually for some days before they cease, one in the afternoon or evening is all that has been required.

Nervous dread of the bath is the most common difficulty met with. Generally, this ceases after a few immersions, but sometimes it persists, or even increases. Such cases are always benefited by a stimulant, just

before the bath; but the addition to this of a small quantity of morphia is almost invariably successful. I have seen a patient who had a horror of the bath thoroughly enjoy it after an eighth of a grain of morphia. Cases marked by persistent high temperature early in the attack, before signs of failure have appeared, rarely show any nervousness about bathing, a most fortunate fact, for such cases are precisely those who derive most benefit from it. The only absolute contra-indications are perforation, hæmorrhage, and advanced cardiac debility. The two former, of course, require perfect rest; the latter precludes anything in the nature of shock.

Although the temperature is taken as the best indication for regulating the number and duration of the baths, yet almost all the other symptoms are as favourably modified.

Circulatory System.

Coincident with the fall of temperature, the pulse diminishes in frequency, often by twenty or more beats a minute, and at the same time it becomes smaller, harder and more sustained, indicating a general rise in blood pressure. Sometimes, indeed, this vaso-constriction is excessive—the pulse, though reduced in frequency, becoming thready, the face and extremities blue. These symptoms need cause no alarm. They are, if anything, of favourable import, and can always be relieved by small doses of alcohol, which here is probably effective in virtue of its action as a vaso-dilator.

In most cases of any duration, a certain amount of cardiac debility gradually appears, as shown by the increasing frequency of the pulse in proportion to the temperature. In those, however, that have been systematically bathed from an early date, it is unusual for this symptom to reach any degree of severity. But occasionally, in spite of the treatment, it continues to increase, and it then becomes no easy matter to discriminate at what point the benefits of the bath are more than balanced by its danger. In cases of doubt, the following plan is often of great advantage:—A single dose of from 30 to 40 grs. of quinine is given about ten p.m. This will usually cause a fall of temperature, lasting from twelve to thirty-six hours, during which time of course the patient will have a complete rest from the baths. Its effect on the pulse is to reduce its rate, and increase its force.

That this tonic or stimulant action on the circulation is to a great extent independent of its action as an antipyretic, is usually very evident. For, in a few cases, although the drug fails to reduce the temperature appreciably, the pulse is almost invariably slowed and strengthened; and in the majority, where the pulse and temperature fall together, the former continues slower long after the latter has risen to its former height.

Other antipyretic drugs, such as antipyrin, antifebrin, the salicylates, &c., have not, according to my experience, this power of increasing the force of the circulation, but have seemed to act unfavourably in the opposite direction. The rapidity of their action (which is no gain where the bath system is used), is quite counterbalanced by the evanescence of their effects.

I should here say that, except in the cases already mentioned, the condition of the circulation, as evidenced by the heart sounds, and more

especially by the frequency of the pulse, is regarded as the only indication for stimulants. Murchison's rule is for the most part adhered to, although the limit of twelve ozs. of brandy per diem—beyond which he considered it useless to go—is frequently much exceeded in bad cases.

Respiratory System.

Bathing modifies the respiratory act in a similar way to the pulse, but to a less extent. When the short, catchy breathing, due to the shock of immersion, has passed off, the respirations become slower and deeper. If bronchial catarrh is present, cough is invariable, and sometimes violent. This is most beneficial; and in consequence, it is found that soon after the commencement of the treatment, the patient coughs only during the bath, although previously he may have been troubled with constant and ineffectual efforts to clear the bronchial tubes. The periodic clearing of the air passages prevents plugging and collapse, and the consequent gradual development of broncho-pneumonia. No fact is more firmly established about this treatment, than its power to prevent this complication.

Whether it is advisable to continue cold bathing when pneumonia is actually present, will depend altogether upon the condition of the circulation. In my experience, more or less cardiac feebleness almost always co-exists, and this I believe to be the best guide, without taking into consideration the condition of the lungs. Rarely a pneumonia, usually lobar in form, complicates, or even masks, the beginning of typhoid. It may then be unattended by any degree of cardiac debility, and is decidedly benefited by the bath treatment. On the other hand, the usual form of pneumonia, which appears in the later stages of the disease, is lobular or hypostatic. It is then probably one of the immediate results of failing circulation, and when it occurs in cases that have been bathed, should in my opinion be accepted as an indication that the treatment has failed, at any rate, in its primary object, viz., that of preventing cardiac debility. If under these circumstances baths are still considered advisable, they should be tepid or graduated, so as avoid all shock.

Nervous System.

Nervous symptoms are probably more favourably influenced than any others. Delirium and stupor frequently disappear in the first bath, almost always after the first few days' treatment. Headache is always relieved, but returns with the rise of temperature. Sometimes the immediate result of the bath is to increase the pain, but this can always be avoided, by sponging the head with ice cold water before the rest of the body is immersed.

Insomnia is almost unknown. Most patients require to be waked for their baths, and I would here say that, although such frequent disturbance may seem cruel, the aggregate of sleep that such patients obtain is far greater than in those treated in the ordinary way. The density of the sleep, if I may use the expression, is greatest shortly after the bath, and gradually decreases as the temperature rises.

Alimentary Canal.

Symptoms having reference to the alimentary canal are all more or less modified; sordes rarely appears. The dry brown tongue, when it is seen at all, becomes moist after each bath; thirst is consequently lessened and appetite improved, and herein lies the great advantage of always giving food at this time. So great is the influence of the bath in this direction, that one may often see a dry brown tongue put in its first appearance during early convalescence, when, from the falling temperature, it has become unnecessary to continue the treatment. Although it may not be permissible to judge of the condition of the gastric mucous membrane by that of the tongue, yet it is certain that digestion in the stomach is much improved. Vomiting is rare, and the appearance of undigested milk in the stools quite exceptional.

Diarrhœa, if it exists on admission, often appears at first sight to be increased. The application of cold to the abdomen causes contraction of the muscular fibres of the intestine, so that for some time a patient may have an evacuation after each bath. This, however, soon ceases. It has been said that external cold, by contracting the cutaneous vessels, must cause an increased congestion of internal organs, and among them of the mucous coat of the intestines. This has been disproved by actual experiment, but were it not so, the fact remains that the constant application of cold to the abdomen, preferably in the form of ice bags, has a marked influence in restraining diarrhœa, and presumably therefore, in diminishing the congestion on which it depends.

The constrictive action of cold on the intestinal muscle is most useful in lessening meteorism. As the flatus is mostly contained in the large intestine, the effect is usually immediate, the patient passing large quantities of wind during or immediately after each bath. Ice bags applied to the abdomen in the interim keep up a tonic contraction of the gut, and serve to prevent the reaccumulation of the gas. Hæmorrhage, as before mentioned, precludes bathing. Ice bags should be applied locally, and are in fact in general use. Whether this accident has been rendered more or less frequent by the cold bath system, has been much debated. My own figures tend to the conclusion that it is absolutely uninfluenced either way.

The same remarks apply to perforation, which, as the mortality statistics show, carries off almost exactly the same number of patients whatever treatment be adopted. There is, however, an interesting fact in connection with the diagnosis of perforation which is worthy of note, as it bears additional evidence to the rarity of brain symptoms. Since the introduction of systematic bathing, there has been no instance where it has not been possible to tell almost the exact moment when this accident occurred. This is in striking contrast to what was observed previously. Low forms of delirium and stupor were common, and it was not rare to find perforative peritonitis post-mortem, which had been unsuspected during life.

Urinary System.

The effect of bathing on the urinary secretion, is greatly to increase its quantity and to lower its specific gravity. The total amount of urea passed is said to be reduced, and this is attributed to diminished febrile consumption of the tissues.

Upon this point, however, I have no data of my own, and the statements of other observers are conflicting. Recently, indeed, experiments have been cited, which tend to show that the excretion of urea is increased by cold bathing ; and Dr. Macalister suggests that this is not due to increased production, but rather to more perfect elimination.

If albumen be present in small quantities, as often happens in severe cases, in connection with a scanty secretion of high coloured urine, a day or two of the treatment is usually sufficient to cause its disappearance. The action of the bath, in causing profuse diuresis, contrasts very favourably with that of the antipyretic drugs, none of which increase the secretion of the urine. Some, indeed, notably antipyrin, have been shown to actually diminish it. My own experience is, that they all act as powerful diaphoretics, and herein lies one of the great advantages of the bath ; for, as has been duly remarked, the sweat glands, as organs of elimination, cannot be compared to the kidneys.

Such, then, is a brief account of the manner in which the cold bath treatment modifies the principal symptoms of fever. It is no exaggeration to say, that typhoid so treated is in its main clinical features a different disease, and as such merits a separate description. Instead of the long catalogue of complications, with pneumonia at their head, that were liable to arise in any case of severity, it can be truly said that, given a case admitted fairly early in the disease, one has little to fear, except the occurrence of one of the accidents—hæmorrhage or perforation.

Before estimating the mortality, some explanation is required.

During the year 1886, the bath was used in only one or two cases. The treatment was mainly expectant, but cold sponging, the cold wet sheet, and quinine in antipyretic doses, were frequently employed, together with alcohol, according to the usual indications. In 1887, every case that was admitted on and after January 1st, was systematically bathed ; unless, of course, this was contra-indicated. Owing, however, to the fact that there was then only one bath, and the wards were quite full, the bathing, though regular, was infrequent. Many patients who would later on have had six or eight baths a day, had then only three or four. It was not until July that arrangements were sufficiently advanced to allow of Brand's rule being strictly adhered to.

I propose, however, to compare the mortality of 1886 with that of the following eighteen months, ending June 30th, 1888, the latter being the whole period during which the bath has been in systematic use. In doing this, I have made an endeavour to eliminate one common source of fallacy in fever statistics. I allude to the variable number of cases of febricula included. No two men are agreed as to where to draw the line between this affection and typhoid. I have accordingly adopted an arbitrary rule, and classed as febricula all cases of continued fever that convalesced before the tenth day. 78 such cases, or $14\frac{1}{2}$ per cent. of the whole, are excluded from the first period ; and 73, or 15 per cent. of the whole, from the second Most of these were, in my opinion, typhoid, and many were bathed. They all, of course, recovered.

In the first period then, there were 464 cases, with 68 deaths—a mortality of 14·6 per cent.

In the second, 415 cases, with 41 deaths—a mortality of 9·8 per cent. So that during the time that the bath was in use, the mortality fell

nearly 5 per cent. If, however, we take the twelve months, from July 1st 1887, to June 30th, 1888, during which Brand's treatment was rigidly enforced, we find better results. Of 243 cases, 20 died—a mortality of 8·2 per cent. This shows a reduction of mortality, as compared with 1886, of 6·4 per cent.

These figures appear to me sufficiently favourable, but to give them their full weight, the following considerations must be borne in mind :—(1) That a very large proportion of the cases were immigrants just arrived in the colony, and unacclimatised. This is admittedly an unfavourable element in the prognosis. (2) That the Brisbane Hospital is the only one for a large and scattered district; that the cases therefore are not selected, except in so far that the worst generally find their way in. (3) While an unusually large proportion of febriculæ (15 per cent.) are excluded, that on the other hand, every death from typhoid, which occurred in the hospital during the time, is included, though many were moribund on admission, and others succumbed from causes only indirectly due to the disease.

Thus of the 41 deaths during the bath period, five died in less than 48 hours from admission; and six, who came in later in the disease than the fourth week, were in such an advanced state of prostration, that cold bathing was considered inadmissible; whilst among the exceptional causes of death were—hæmorrhage from abortion; hyper-pyrexia following an ineffectual attempt to pass a catheter on a case of tight stricture during early convalescence; old fatty heart; and acute cystitis during convalescence—one case of each. I do not think these results can be explained on the hypothesis, that the type of the disease was milder.

The average duration of cases that recovered was almost identical in both periods, viz., 23·1 days in the first, 23·2 in the second, and nearly the same proportion of febriculæ were excluded upon each, rather more in fact from the second. Moreover, a strong argument in favour of the identity of the type of the disease in the two periods, is found on analysing the modes of death.

Of the 14·6 mortality in 1886, 5·2 per cent. of all the cases died from hæmorrhage or perforation. During the bathing period, of the 9·8 per cent. mortality, perforation and hæmorrhage accounted for 5·5. It is evident, therefore, that the accidents due to the intestinal ulceration were absolutely unaffected, and that the whole saving was in the diminished number of deaths due to febrile causes. Exactly the same conclusions were arrived at by Drs. Cayley and Coupland, at the Middlesex Hospital. These observers contrasted the results obtained, during the period from 1872–78 inclusive, with those of the following five years, during which the antipyretic treatment was practised. By comparing the total number of cases under treatment, they found that the rate per cent. of deaths from hæmorrhage and perforation was almost exactly the same in the two series, showing that there was a diminution of the other causes, but no increase of these complications.

Again, since of these two accidents, perforation claims many more victims than hæmorrhage, and as it is an established fact, that the former is far more common in men than women, we should expect to find the female mortality more favourably affected than the male—and this has been the case to a marked degree. In the first period, the male mortality

was 12·6 per cent. the female 18·9. In the second, the male 12·2, the female 5·4. On analysing the causes of death, this result is found to be entirely due to the comparative immunity of women from perforation. I should here say that in the 109 fatal cases, the immediate cause of death was verified by post-mortem examination in all but five.

I have hitherto avoided discussing the rationale of the bath treatment. Its original introduction into Germany was the practical outcome of the theory, that the temperature was the immediate cause of most of the symptoms and complications of the disease. Of late years, the truth of this has been much questioned, and yet those who are foremost in attacking the doctrine, admit that cold baths deserve the first place among the therapeutics of fever. Quite recently Dr. Macalister, in his Croonian Lectures on Antipyretics, recalls the theory of Murchison, that most of the phenomena of the typhoid state are uræmic in origin, and suggests that the benefit of the cold bath is due to its powerful diuretic action, causing free elimination of accumulated waste nitrogenous products. The beneficial action of cold bathing can be understood on this hypothesis, as well as on the other, and it is probable there is much truth in both. But neither are sufficient. Delirium and stupor occasionally clear up too rapidly to be accounted for, either by reduction of temperature, or improvement in the composition of the blood, so that it is evident that any theory, to be complete, must include a more direct action on the central nervous system. All these, however, are questions for pathologists to decide. Fortunately, the success of the treatment is not dependent on their correct solution, but rests at the present day upon a vast accumulation of clinical facts.

In conclusion, I must allude to a recent valuable monograph on the subject, by MM. Tripier and Bouveret, of Lyons, which all who are interested in this method of treatment should read. In this work, the whole question is treated with such minute attention to clinical detail, that I regret it did not fall into my hands until the latter part of 1887, when the system was fairly well established. Otherwise, much needless trouble and anxiety on my part might have been avoided.

NOTES ON TYPHOID AND ITS TREATMENT.

By F. H. Bonnefin, L.R.C.P., Stockton, Newcastle, N.S.W.

In the present state of medical science, we must confess that knowledge about the etiology and treatment of typhoid fever is still very imperfect. For whilst some hold that typhoid fever (or better, enteric fever) is a specific disease, produced by a bacillus or its spores, and that the disease cannot arise *de novo* ; others assert that, though the disease is due to micro-organisms, yet it can arise *de novo* by the transformation of ordinary bacilli into a virulent variety. There is still another sect who hold that enteric fever may, undoubtedly, arise from decomposing animal matter, placed under certain conditions of heat and moisture. All the above theories tend to show that the subject is far from being settled, and therefore, anyone holding views on the subject, not inconsistent with reason, and arrived at by scientific deductions, may claim

also to have a hearing. Whatever may be the cause of typhoid, all agree on the pathological lesions, which are characteristic. In all cases the small intestine is affected, but more specially the glandular structures known as Peyer's patches, and the solitary glands. In them, we may find simple inflammation, or proceeding one step further, necrosis of the tissues and ulceration. The real use of Peyer's patches and solitary glands has not yet been clearly defined, and when this is perfectly demonstrated, I am certain that a very great step will have been made towards the knowledge of the disease.

I will now briefly state my views, hoping that by inducing criticism, more thought and discussion may be excited on a subject of vital importance in these colonies. I have always thought that enteric fever was symptomatic, and not idiopathic. A good many of the fevers, which were formerly classed under the heading of idiopathic fevers, have, in the light of more recent knowledge, been proved to be pyrexiæ, caused by acute inflammation in some part of the organism. Why, therefore, should we not consider enteric fever as a pyrexia, caused by inflammation of certain specified structures of the body, to wit, Peyer's patches and the solitary glands. It is certain to be objected, that the height of the pyrexia has been proved not to depend absolutely on the amount of the lesions observed. But it may very well be in direct proportion to the absorption of inflammatory or septic products; and knowing that the implicated structures are in direct communication with large lymph spaces, is there any wonder that absorption is simply regulated by the blocking or patency of such spaces?

The rise and fall of temperature is very often typical, and we may understand why it is more so in this than in other fevers, if we bear in mind that absorption is generally more active when the circulation is more rapid, and this is more the case with lymphoid structures and lymphatics generally, than with any other tissue or organs in the body. The morning temperature of enteric is generally lower, because the circulation at night is slower, and therefore the absorption of inflammatory or septic products is less. In that way, the temperature gradually falls during the night, and again rises during the day. It is generally considered as a bad sign, when the morning temperature is not lower than it was the previous evening; this shows, either the patient has been sleepless, or has had very troubled sleep, and so, the absorption going on uniformly, the intensity of the malady is increased.

It is on the foregoing assumptions that I have based my treatment of enteric. What I wanted to use was some medicinal agent, which could at the same time slacken the circulation, cause elimination of effete and noxious substances, disinfect the contents of the bowels, promote the healing of ulcers, or check inflammation, without causing distressing symptoms, as very often is the case with quinine and salicylic acid. I need not give in detail my different trials in this direction, but will simply state that, since the second part of 1887, I have used the following:—I give a mixture of naphthalin and antifebrin (gr. vi.-viii. of each), three or four times a day, according to the urgency of symptoms. Should there be constipation, I get the bowels moved at least once a day by means of a simple enema, or one containing a little starch, soap, or castor oil. I draw special attention to this measure, for I have found naphthalin of little use unless the bowels are moved, so as to allow of

the local effect of the drug. Intense diarrhœa also must be checked, as it does not allow the naphthalin to act beneficially. I order such diet as will not produce much fæcal matter, or form any solid or irritating material ; so I prefer a mixture of milk and barley water, in equal proportions, or some chicken or veal broth. Sometimes concentrated beef tea is too irritating.

The average duration of cases has been under fourteen days, and this year it has come down to twelve days.

I hope that this treatment may be given a trial, for the results in my hands have been very good. Since I have adopted it, I have lost only one case, and this under the following circumstances :—

Mrs. R., aged about 30, just returned from England, began to show signs of enteric fever the day after landing. Saw her two days after, when she had a temperature of 104°, bad headache, and all the other signs of enteric fever. I was using then the antipyrin-naphthalin treatment, instead of antifebrin-naphthalin. In eight days the patient said she felt entirely well, and the temperature remained normal for twenty-four hours. I asked her to be careful, notwithstanding, and go on with the milk and barley water diet, and remain in bed. I had scarcely left her place before she partook of a heavy meal, composed of roast mutton, boiled potatoes, cabbage, and beer. Half an hour later, she was taken with intense vomiting and griping pains. The temperature the next day, when I saw her, had run up to 104·8°. By energetic measures, and same treatment as before, I succeeded in getting her right again about six days after. I told her that she must be more careful this time, but it was all to no purpose, as she left her house this same afternoon for a walk by the seaside, and was found there and brought home in a very weak state. She died two days after, all my efforts this time being unavailing.

I should have stated that, before employing the naphthalin-antifebrin treatment, I had recourse to antipyrin and naphthalin for nearly a year, but that I adopted antifebrin as being safer, and causing greater elimination of effete products, whilst at the same time I found that its antipyretic effects lasted longer.

The naphthalin and antifebrin are ground into an impalpable powder, and administered as such.

[Appended to Dr. Bonnefin's paper were notes of ten cases, illustrating the course and termination under the treatment recommended.]

DISCUSSION ON TYPHOID.

The CHAIRMAN, when calling on Members to take part in the discussion, said that, on account of the time which had been given to the reading of papers, it would be necessary to confine remarks made to points connected with the etiology of typhoid.

Dr. WHITTELL said :—It has been my duty during the last five and a half years, in connection with the Central Board of Health of South Australia, to pay particular attention to the etiology of typhoid fever—to the origin of cases in South Australia, to their mode of progression, and to the best means by which we were able to put a stop to the progress of different outbreaks that have occurred during that period. From my experience, and from my experiments in bacteriology, I have arrived at pretty much the same conclusions as were arrived at by Dr. Carstairs, in the paper which he has read to us. I believe that typhoid fever is due to a bacillus of a specific character, always the same bacillus, and that that bacillus propagates itself partly in the bodies of the persons affected, and partly in the various materials with which it may be brought into contact, after it has passed through the body in the evacuations. It is very important that we should have a fixed notion about this bacillus and it habits, and the means by which it is propagated. Probably, we shall have to take many years in the study of the bacillus, before we shall know all about the etiology of typhoid fever; but thus far, all pathologists have arrived I think at the conclusion, that the bacillus passes in the dejecta of the patients, and that it may be carried away in various modes. It may propagate itself in those waste matters which are too frequently allowed to surround houses; may be carried into our water at long distances from where it was originally deposited; may contaminate our milk supplies, owing to the negligence of milk sellers, and the want of laws to regulate them and their dairies; and, I believe, too, although it would be disputed by a good many people, that it may be disseminated through the air. I will just mention some three or four outbreaks, in which I have been personally interested, during the time I have occupied the position in connection with the Board of Health in South Australia. During that time, I have had personally to investigate two cases, where undoubtedly the outbreak of the disease amongst the people was due to milk. In one case, after a good deal of troublesome inquiry, in which we were resisted by the dairyman in all directions, and told there was no disease in the man's house, although we had traced, as we believed, several cases of typhoid fever to the milk he had supplied, we succeeded in finding that there had been a case of typhoid fever in the house, and that when the medical officer went down to inquire into the history of the case, the patient, who was then convalescent, had been hidden away from the sight of the medical practitioner—positively hidden amongst the milk cans in the dairy behind. I had a good deal of difficulty with that dairyman, he defied me, he said he would not stop the sale of milk, or sell the cows, or do anything he had not already done. However by a threat, that if another case of typhoid fever should occur in connection with any of his customers, I should certainly call on the Coroner to hold an investigation,

I succeeded in inducing him to remove the cows, and place them under the care of persons who had not been in contact with this typhoid fever patient, and by that means we succeeded in arresting that epidemic. I had another similar case, where, after investigation, we found a boy who had been undoubtedly affected by fever, and had been nursed by his mother and friends, who had had the handling of the milk cans, and of the various dairy utensils. These cases illustrated well enough to me, and to any one acquainted with their history, how typhoid may be conveyed through milk, to persons living in houses where everything that is desirable, so far as regards sanitary arrangements, is to be found. Now with regard to water; we know that French practitioners of late days have nearly all come to the conclusion, that typhoid is propagated chiefly by water. In Melbourne, where there is a water supply like the Yan Yean, which I am told by competent authorities is pretty fair, though it has a few faults that must be corrected, but which on the whole is of a very fair, good, and wholesome quality; or in a place like Adelaide, which also has a very good water supply, it is difficult to understand how the water can be a source of typhoid fever. Speaking as to our own towns in South Australia, and I think I may say the same of Melbourne and its suburbs, I do not believe that the water supply has anything to do with the typhoid cases. Still, we know that water will become contaminated, and may be a source of conveyance of the typhoid microbe. I have seen cases where that undoubtedly has been the case, and one of these was just outside Adelaide, where, owing to the wells supplying the household water being near the cesspools, there was an undoubted contamination, detectible by smell, caused by the passage of fæcal matter from those cesspools into the wells.

Dr. JAMIESON said that it might be interesting, so far as Melbourne is specially concerned, that he should say a few words about what he had seen and known, and try to sum up some facts as to the spread of the disease in the city, and the causes of that spread. Before going further, he would like to draw attention to a chart, which illustrated in a graphic way the prevalence of typhoid in Melbourne and suburbs, during a period of 23 years, from 1866 to 1888. The particular point to be noted is, that at periods recurring with great regularity, at intervals of four years, the mortality from typhoid attains a maximum, and then subsides. The curves were based, not of course on the absolute number of cases, which would be fallacious in a rapidly growing town, but on the proportion per hundred thousand of the inhabitants. This fact should be kept in view, in reference to all questions of causation, which would have to be tested to some extent by the comparative prevalence of disease. As to the probable causes of the spread of the disease in Melbourne, of course it is clear, as everyone knows, that in a large city there must be always special difficulties in inquiring into the occurrence of cases, how they come about, and why they spread. About the special causes that are always adduced, he might refer first to the water supply. In regard to that point, already mentioned by Dr. Whittell, he could not believe that the contamination of the Yan Yean water supply has any appreciable effect in spreading typhoid in this city. Even if there is a possibility of an occasional contamination of that water, the possible sources of contamination are so small and scattered, that such contamination could be only a comparatively rare event. It seemed

inconceivable that contamination of that water supply, which is distributed all over the town, if it were an important cause, would allow of the disease beginning, with some severity, in November, and increasing in January, February, March, April, and May, year after year. If the contamination of the water supply had much to do with it, the outbreaks ought to be in great epidemics, and then stop; but year after year it goes on in the same way. The next question is as to milk, how far that may be supposed to have much to do with the spread of disease in this town. He did not question at all the probability that milk does get contaminated, and is distributed in Melbourne, and causes typhoid; he did not question the validity of the argument that Professor Allen adduced. He was acquainted with the Jolimont outbreak referred to, and was prepared to believe that milk was the cause of the spread of typhoid at the time, but the same argument must be applied to milk as to water. It was not easy to see why milk should go on year after year causing this regular rise and decline of typhoid. As to specific experience, he could say that during the years 1887-8, he had occasion to inquire officially, as health officer, into this milk question in relation to typhoid. And though he had started with the expectation of finding a connection, he had not been able to put his finger on one single instance, in which he was satisfied that milk had been the cause of the spread of the disease. Then, what are the causes? There remains the drainage; there remains nightsoil disposal, especially. It could not be questioned at all, that Melbourne is an excessively badly drained city. The most recent visitor must have seen the foul water trickling slowly along, never reaching its destination, unless that destination is to sink below the surface. In the course of enquiries, he had made this distinct observation repeatedly, that where serious outbreaks of typhoid occurred, it could almost regularly be shown that it was usually in a crowded or badly drained locality. Not long ago, Dr. Simpson, the Health Officer of Calcutta, was here, and having made the remark, "I have seen the good streets of Melbourne, the fair side of Melbourne, can you show me the other side?" He (Dr. Jamieson) took him to places where cases of typhoid occurred, which he attributed to soakage of foul water round the houses. After visiting a number of these localities, Dr. Simpson was satisfied that the cause of the outbreak was to be found in the fact, that the water had been soaking down to these houses on the low level; that they got it, and with it the typhoid. Of course, we must admit that the mere soakage of foul water will not do it, that goes on all over the world; but if you get that, and a specific infecting material, you are bound to get typhoid largely. He would like to narrate a curious instance that came under his notice within a few days before, illustrating the influence of a bad arrangement for the disposal of nightsoil, and with it, the neglect of precautions. The medical man attending a patient reported that there was a case of typhoid in a certain house. There were two children ill in the house at that time, but there had been a previous case six weeks before. On visiting the house, he learned that there had been expended, one tin of carbolic powder and one little bottle of Condy's fluid, which had been spread about the house in saucers. That several cases should occur in such a house was to be expected. But the matter did not end there. The closet belonging to this house, in which those three cases had occurred, had been pushed away, naturally enough,

from the people's own house, and made to abut on the fence of another house, so that the back wall of the closet actually formed part of the fence. There was no communication between the houses, which faced to different streets. About the same time that the two cases occurred in the first house, two children in the other house got the disease, and both died. There was no absolute proof that these fatal cases were caused by the emanations from that closet, but it looked like a deliberately arranged experiment to prove that nightsoil, not properly dealt with, will cause the spread of typhoid. Those were the two points he wished specially to bring out.

Dr. Leger Erson said that, having come recently from Auckland, where there was a great deal of typhoid, he was deeply interested in the discussion. The question had been raised, whether typhoid can arise *de novo*. He had seen cases in the bush, where there had been no typhoid; no history of any within the memory of Maori or white man —cases where one, two, or three children had been affected from a distinct source of causation—merely some putrid animal matter lying about where the children played. He had also seen typhoid occur on board ship, when three months out at sea. Where was the previous source of causation there? He made inquiries, and came to the conclusion that it came from neglected bilge water, no cases having occurred in the ship before. In towns, there was often a mistake in getting an artificial water supply, without a single thought given as to the disposal of sewage, though they should go together. He had remarked that in Melbourne there was a system of earth closets where no earth was used, and that is an important point in the causation of typhoid. Even in Fiji they are more advanced in sanitation than we are. There they have a man inspecting the closets, and if the earth is not used, a heavy fine is inflicted. That was a suggestion for adoption in Melbourne.

Dr. Kirtikar (of Bombay) said that it would be of some interest to the members of this Congress to know what was thought of typhoid fever in India. The late sanitary commissioner of Bombay (Dr. Hewlett), said that the natives of India are born in filth, brought up in filth, and die in filth! Of course there will be very few who will accept this wholesale condemnation of India, but there is a good deal of truth in it. There is a good deal of filth around us; a good deal of cholera around us; a good deal of malaria around us. There are all sorts of malarial fever—intermittent, quotidian, quartan, tertian, and a very terrible form of remittent fever. Well now, this remittent fever, to a certain extent, corresponds with the typhoid fever of Europe and of this country, but the true typhoid fever is said to be almost absent. It is found to prevail among European troops alone, and among Europeans arriving in India. It is scarcely seen amongst natives. The army doctors of the British medical service all combine in thinking that the members of the Indian medical service are not able to diagnose typhoid fever among the natives, but we think we ought to know something of the diseases prevalent among the natives of India, as we have the whole field of medical practice in India to ourselves. The British army doctors think we make a mistake in not diagnosing more cases of typhoid in India; but as a student of bacteriology—that large department of science—I consider that, although we have remittent

fever, with diarrhœa very often fatal, the absence of typhoid is a very significant fact. There is a something in typhoid that has a particular cause—a special germ—which as yet has not been able to find a congenial soil in India. Now, it is for me and others in India, who work in the field of bacteriology, to find out hereafter, from what I learn from you here, whether there are any special circumstances in this colony causing typhoid, which are absent in India, and *vice versâ* ; and it will be an important lesson for us to learn that mere filth cannot cause typhoid. I am sure this consideration will afford an interesting field for further investigation. But there is one point which I want to bring before this Congress, with reference to the particular form of remittent fever we have in Bombay. There is a kind of fever that corresponds with typhoid fever, but there are certain points of difference. We have the remittent fever, which lasts very often over twenty-one days; there is the remission, the morning remission, and the evening rise, but it is not the remission of typhoid fever. There is a kind of diarrhœa present sometimes, though very often it is absent. Where the diarrhœa exists there are stools, very nearly allied to the "pea-soupy" stools of true typhoid. We have occasionally hæmorrhagic patches under the skin, corresponding to those in real typhoid. We have also, when we come to study the pathology of the intestinal tract, the Peyerian patches also affected, but not to the same extent. Strangely enough, in this particular kind of fever, the secreting glands of the wall of the intestinal tract are attacked, swollen and fringed. The mesenteric glands not so largely and so early implicated as in true typhoid. These pathological appearances show some kind of connection between the typhoid fever you find here, and the septic Bombay fever I am describing, and a careless observer is liable to mistake the post-mortem appearances of the one for the other. It will afford an interesting field for research to pursue the pathology of this Bombay fever. In 1886, Dr. Vandyke Carter first directed our attention to the Peyerian ulcer lesion found in the remittent fever of Bombay, attended with diarrhœa and simulating typhoid. It will be my pleasure, when I return to India, to send to the Medical Society here, and to any other society in the colonies which the Secretary informs me about, copies of the Transactions of the Bombay Medical and Physical Society for your information—Transactions in which Dr. Carter gives us his first instalment of researches on fever with Peyerian lesion—in order that you may be able to know that, although in India we have no typhoid, we have this particular kind of remittent fever which is the scourge of the Indian peasant, as also the Indian citizen. It is a terrible disease, and its origin can be traced to septic poisoning from filth. The great danger from typhoid, as far as I know from my books, and as far as I learnt as a student in England, is pneumonic complications, and complications especially connected with the heart, as Professor Allen has just told us ; but in India, this remittent fever is very often complicated with brain symptoms, and we have what they call "*the brain fever*." This form of fever in Bombay is particularly dangerous in the earliest stages, the ninth day being the most dangerous. We know that even in its early stages, typhoid is very dangerous. In some cases, the person is actually bowled over long before the stage of diarrhœa sets in, or petechiæ appear. So far, the two fevers resemble

each other; but on the other hand, in the Bombay remittent fever, we have a special kind of pathological and final result, which is not quite characteristic of typhoid.

Dr. NEWMAN said that it was important to note the variation of the type of the disease in this country. It is altogether different in some respects from typhoid fever in the old country. Very rarely we have diarrhœa, but we have constipation; and as to spots, we often do not see a sign of them. About the variations of typhoid disease, we find in some epidemics we get nothing but head symptoms, and in others troubles connected with the bowels, though not necessarily diarrhœa, and even we get sometimes hæmorrhage in the bowels, with the constipation. I think there must be something different in the typhoid fever in these colonies from that at home, or we would not have such remarkable changes.

Dr. ELLIS (Sydney), said:—We have all been talking about germs, and I do not know how many here have studied them scientifically. There seems to be an idea that if one germ gets in, it causes typhoid fever. The great question is, the quantity of germs necessary to cause typhoid. Some people have taken in a certain amount of germs, and not got it, and a great deal depends on the dilution. Ordinary filth, by standing, does not cause it, or it would be much more common than it is. The question is—How far does the filth help the germination, so that they can come together in large quantities, sufficient to attack the individual, and cause typhoid fever? and on this point I lay stress as to milk. I think if you get contaminated milk, and let it stand for some time at a certain temperature, you will very greatly increase the probability of giving typhoid fever to those people who drink it. The ordinary process of scalding it does not sterilize the spores; you must steam it for ten or twelve minutes, and less injury is done to the milk in that way than any other. This especially applies to milk for children. As to the use of filters, the ordinary filters are perfectly useless—the only one I know of that is any use is Chamberlain's. I made some cultivation experiments with those. I took some water from an ordinary tap in Sydney, and found that it had 30 germs to the cubic centimetre. I took the water from the Chamberlain filter, which had no germs, but I passed the water through that, and then through my own filter, which I had been using, and after that I found 300 germs to the cubic centimetre. Supposing your filter got contaminated in this way, you simply have the ground for growing the typhoid germs. I do not think it is conceivable, to any person who has studied germs, that it is possible for the typhoid germs to be developed out of any other germ; but where the typhoid germ gets into ground that is prepared for its propagation, it will develop rapidly. There is another point. The ordinary idea as to rendering the stools aseptic in the ordinary way, is by adding a small amount of carbolic acid or corrosive sublimate. You may do a great deal more harm than good. That is a very curious statement, but it is true all the same. You will find generally—I do not know that it holds exactly with typhoid—that the poisons and ptomaines generated with the ordinary putrefaction, are very deadly to the ordinary fever germs; but the ptomaines are more easily prevented from growing than the fever germs, and if you put a small amount of antiseptic into the stools, you will

prevent the ptomaines generating, whereas you give a splendid opportunity for the typhoid germs to develop, especially if a little later on the matter gets spread over the soil.

Dr. Bright (Hobart) said :—I think I can throw a little light on the subject of typhoid. In regard to the paper read by Dr. Robertson, I wish to say I know a few facts that do not quite coincide with some of the statements he made. He told us that typhoid is not conveyed from the sick to the healthy. I am sorry to say I have had pretty strong proof that it is. I have seen a good deal of typhoid fever the last twenty-five years; but within the last two years at Hobart, at the hospital of which I am one of the staff, we have had 500 cases—200 last summer, and 300 the year before. Fully a fourth of those cases had to pass under my hands. There we found a large number of our nurses were knocked up by nursing the sick ; and it goes to contradict another statement of Dr. Robertson's—that recent stools are not infectious, but they must be first fermented. I think they are infectious from the first, and I believe it was in that way the nurses in the Hobart Hospital became knocked over with fever in the way they were ; and when we found they were being made so ill, we began to look carefully into it, and we found that from the number of cases they had to look after, the practice of removing the bed-pans was rather lax. The pans were not sufficiently disinfected, and not covered over when they had to be carried a short distance from the wards ; and sometimes this was done at once, the same as an ordinary stool might be. When we found this out, we insisted on disinfectants being used, and had the pans covered, and after that the nurses ceased to be affected. That goes to show that recent stools are infectious. Then Dr. Robertson told us that one attack gives immunity from future attacks. I am sorry to say I have had positive proof that that is not the case. I attended a patient three or four years ago for a moderate attack of typhoid ; there were spots and all the ordinary symptoms, and last year I attended him for a more severe attack. As to the spread of typhoid, the conviction has been forced upon me that hospital patients, after they have left the hospital, and are supposed to be convalescent from typhoid, are capable of spreading typhoid among the healthy. Numbers of patients have left the hospital, after recovery from typhoid ; not in one, two, or three, but in a good many instances, we have had cases come back again from other members of the family a few weeks after they have gone home, where there was no typhoid previously in their houses. I have known typhoid patients, who have been asked to stay in houses in the country to regain their strength, and typhoid has broken out after they have gone there ; so I am fully convinced that typhoid patients, for some weeks after their recovery, are rather dangerous persons to have about houses, unless precautions are taken to disinfect their stools, the same as when they are suffering from the fever. In order to prevent the typhoid, the stools of convalescents should be disinfected, for at least three weeks after they are supposed to be quite well.

Professor Kernot, speaking by permission, as a member of the Central Board of Health, desired to raise the question of the best kind of channels. Large towns might be properly sewered, but small towns would have to depend on surface drainage.

The CHAIRMAN, in closing the discussion, regretted that the time had been so short that the gentlemen who spoke did not speak as fully as they might have wished, and that others had no opportunity to speak at all. We all agree, no matter how much we may disagree as to how typhoid is produced (whether it can be produced *de novo* or not), that filth is a very important factor in its production, and the question is, how can we best get rid of all the causes which go to produce or propagate this disease? As to the question which Professor Kernot asked, the best way to make surface channels, I may mention that in the city of Brisbane, they are made with cement, the advantage being that the channels are impervious to water, and are very easily cleaned, and they appear to answer very well as surface channels, where they are needed to convey sewage. But where at all practicable, I think it can be ascertained that sewage on a separate system, by which the rainfall is excluded, will be found the best and cheapest, and most easily managed. On this question I read a paper before the Health Section, which, I believe, will be published and made generally known. There is a discussion of the system, which has been in operation in the United States for the last ten years, and has answered admirably well.

The CHAIRMAN then stated that certain resolutions had been drafted by way of practical conclusions, and these would now be put before the Congress.

Dr. VERCO (Adelaide) said :—The following resolution has been given me to move, which I can do with all confidence :—"That the members of the Intercolonial Medical Congress regard it as proved, that typhoid fever is a preventable disease, which owes its prevalence mainly to insanitary conditions, and above all to contaminated water supply, defective drainage, and improper disposal of nightsoil." It will be noticed that this is a very practical sort of resolution ; that it leaves out almost entirely all theoretical considerations. It is not a question as to whether we have to deal with a simple organic poison in the shape of a ptomaine, or an organism like the bacillus. It does not traverse the question as to the exact amount of heat that may be required for the cultivation of these germs, if germs they be ; nor does it shut out the possibility of the origination of the disease *de novo* ; nor does it involve the necessity of the pythogenic origin of typhoid fever. We all allow it is a disease that can be prevented, and that it is a disease which owes its prevalence, apart from its specific origin, mainly to insanitary conditions. We all allow it is very frequently brought about by contaminated water supply, and proofs are given of its connection with defective drainage, and with the improper disposal of nightsoil.

Dr. D. COLQUHOUN (Dunedin) seconded the motion, saying :—I think there can be no question that it is amply justified by our knowledge of typhoid fever.

The motion was carried unanimously.

Dr. TURNER (Melbourne) moved the second resolution :—"That while there is reason to believe that the sources of the water-supply of Melbourne are carefully guarded, it is certain that, as regards drainage and nightsoil disposal, the arrangements are very unsatisfactory ; and to these defects must be ascribed, in great measure, the excessive prevalence of typhoid fever year after year."

Dr. J. Davies Thomas (Adelaide) seconded the resolution, saying :—Our object, I am sure, is to strengthen the hands of the medical profession in Melbourne, in bringing about a very much needed reform. It happens to me to have lived for some years in Adelaide. I have lived there under circumstances when sanitation was completely neglected; and now, when the sanitation is excellent, I can speak in the most decisive terms about the enormous advantages that have arisen to Adelaide from the introduction of a proper system of water-carriage of sewage, and its distribution on the soil. To the best of my belief, there is no serious drawback which can be urged against it. At the outset there were some objections, because the ventilation of the sewers was not all that could be desired, but that has all been remedied. I may say that I have had an opportunity of visiting many cities in Europe, and I can say, with all humility, that I know of no city the sanitation of which is, to my mind, so nearly perfect, as that of Adelaide at present ; and with the freest acknowledgment of all I see to admire in this city, I am simply shocked at the system for the disposal of nightsoil, and the drainage that obtains here.

The motion was carried unanimously.

Mr. E. M. James (Melbourne) said :—Many of our visitors have noticed very painfully the imperfect condition of our closet system. The pan system must undoubtedly be condemned, and that in no measured terms. On those very hot nights, when the temperature is high, we are obliged to shut out even the cool southerly breeze, to keep out the odours which I can certainly characterise in no other terms than as abominable stinks. I think there can be no doubt about the propriety of this resolution, which I now move—"That in the opinion of this Congress, it is the imperative duty of the Government to take immediate steps for bringing about an improvement in the sanitary condition of Melbourne, and specifically for the construction of a proper system of underground drainage, which shall include the removal of nightsoil by water-carriage."

Dr. Bright (Hobart) said :—I second the resolution with very great pleasure, and without any hesitation at all. I do so all the more readily, because I am sorry to say that, within the last two years, I have seen two or three cases of typhoid, which have been taken back to Tasmania by young residents there, and visitors here for a short time, infection having been caught from the closets at hotels and coffee palaces here. I can bear out the statement, that the pan system is an abominable one. We have had it only two years in Tasmania, and I believe we have to thank that for an outbreak of typhoid fever the last two years, which has been quite unprecedented. For 25 years before, we had not more than 50 or 60 cases per annum. Last summer it was 200, and the summer before that 300, and that is since the pan system came into use; and I know of one case, at least, where the cause was traceable to the patient only getting one whiff, in passing one of those pans which contained these abominable contents.

The motion was carried unanimously.

SECTION OF SURGERY.

PRESIDENT'S ADDRESS

By Edward C. Stirling, M.A., M.D. Cantab., F.R.C.S. Eng.

Surgeon to the Adelaide Hospital;

Lecturer on Physiology and on Clinical Surgery in the University of Adelaide.

Is Surgery a Science?

To have been appointed to the honourable position in which I find myself to-day is a signal compliment to the youngest of the rising medical schools of Australasia, which demands that my first expression should be one of grateful and respectful thanks to those who have thought fit to confer upon me an unmerited and wholly unexpected honour. But any pride of place I may feel disposed to feel is tempered by the knowledge that high office bears its inevitable train of duties and responsibilities, which, in the present instance, may well excite a profound distrust of my ability to discharge with credit the task that is laid upon me. That I should presume to make the attempt is largely due to the fact that, in addressing this distinguished assembly, I speak also to those who can best appreciate the difficulties of such an office, and who, therefore, in virtue of our genial brotherhood, will surely make the most generous allowance for deficiencies which I fear must be inevitable.

On what subject, then, shall I, lacking the ripe experience of many of those who honour me by their presence to-day, venture to address my honoured colleagues? Instruction is not in my power to offer. New truths are few and far between, and come not to ordinary mortals. Retrospect, though a wholesome and salutary exercise, is a well-worn way. The future, who shall foretell it? Nay, how even shall we read aright the present; offspring of the past and parent of the future, how shall we discern the manner of its growth, and in the tendencies of to-day, perchance, foresee the realisations of to-morrow? What are the signs of the times; are they messages of a hopeful and unbroken progress, or is there for us, too, a writing on the wall? Are we surgeons but expert craftsmen of a finer sort—mere artistic handiworkers in a benevolent calling, or have we borne our part in the amazing march of science that has characterised our age? This may fitly bring me to my theme, for I propose to seek an answer to the question—Is surgery an art merely, or has the time yet come, or is it coming, when we may speak of a science of surgery, and of the boundless hopes of progress in

the future which such a definition cannot fail to excite in our minds? An ambitious effort perhaps, yet one which should be made, and surely there can be no more fitting occasion to proffer such questions, and to seek their answers, than in this assemblage of fellow workers and joint seekers after truth.

I think no one will question the propriety of the term art as applied to surgery, indeed the healing art is perhaps the best, as it was the earliest designation of our calling. Its antiquity is probably as great as that of the human race itself, and it is easy to picture to ourselves how the surgical craft had its earliest beginnings, among primeval men, in crude attempts to alleviate the pain and inconvenience of those wounds and fractures to which the predatory habits of our ancestors must have given frequent rise. In short, the first surgery was the rough and ready practice of the battlefield. And thus, the art of surgery is probably one of the oldest as well as the most cosmopolitan of all the arts, having, like the art of agriculture, owed its rude beginnings to the pressing and painful necessities of mankind; and yet again, like agriculture, with which our own art has so many interesting analogies, having reached even in very early times a high degree of wholly empirical success.

Truly the words of the Preacher, "There is no new thing under the sun," come home to us with unexpected force, when we have good reason to believe that at the time our neolithic ancestors were chipping and polishing their flint flakes and celts, building their lake-dwellings, and laying the foundations of those arts of spinning, weaving, pottery-making, agriculture, and mining—without which we can scarcely realise what our lives would be—they were also, with their rude stone implements, sawing, scraping, or drilling live skulls, almost certainly for depressed fracture, and probably also to set free the evil spirits they held to be the cause of epilepsy; thus laying the foundations of an art of surgery, and even forestalling by some thousands of years its most boasted and promising achievements of modern times.

Passing from these amazingly interesting indications of prehistoric surgery to the period of history, if we look at the records of the practice of our art from the time when they become intelligible to us, first as rare and scattered episodes of peace or war sung by the poet* or chronicled by the historian, then as systematic treatises by acknowledged teachers, it is impossible not to be struck with the appositeness of many of the means employed in the treatment of surgical emergencies, the high degree

* *Αὐτὰρ ἐπεὶ ἴδεν ἕλκος ὅθ' ἔμπεσε πικρὸς ὀιστός*
αἷμ' ἐκμυζήσας ἐπ' ἄρ' ἤπια φάρμακα εἰδὼς
πάσσε, τά οἵ ποτε πατρὶ φίλα φρονέων πόρε χείρων.

Hom. Il. iv., 217-219.

of enterprise shown in the undertaking of some of the most serious operations, and the remarkable ingenuity displayed in the invention and construction of the necessary instruments and appliances so plainly the prototypes of many of the best modern tools of our craft.

If already I should seem to stand forth as a mere *laudator temporis acti*, it is because I think we are all of us sometimes not a little prone, while boasting of the achievements of the present, to overlook the deep debt of gratitude that modern surgeons owe to their great forefathers, remote as well as near, and as a great English statesman has said, there is no greater folly upon earth than to undervalue the past. Indeed, considered as an art, it is almost impossible to over-estimate the largeness of the debt that is due, and any self-complacency we may feel in boasting of our modern progress, may well receive a wholesome check in the contemplation of the accurate and successful work done by many of the men of old time. But if we may truly say, as I believe we may, that surgery does now enjoy a position and vitality which distinguish it as something differing in kind, as well as in degree, from the surgery of past ages; if, in truth, we are something more than glorified descendants of our barber forefathers and stone-age ancestors, the reason is that surgery is no longer merely an art. It is something more. It is, as we hope and believe, a science. And while as an art, as I shall attempt to show, our craft is within a measurable distance of finality; as a science it is only in a healthy and vigorous infancy, which offers abundant hopes for a splendid maturity.

At first purely empirical in its methods, the healing art came at length to be dominated by theories of pathology. Wind, bile, phlegm and humours of various sorts pervaded the system, and were the causes of all bodily ailments; the treatment was a direct attack to effect their expulsion and translation as material entities, and, as we know, the mind has scarcely yet shaken itself free from the strong hold taken upon it by the humoral pathologies, nay, do we not find even in ourselves survivals of our old beliefs in theories of metastasis, and in the potent and efficacious drawing and driving powers of issues, plasters, blisters, and such like medicaments. Perhaps we are inclined to laugh at theories such as these, but we should remember that erroneous and often ludicrous as were these practices, they were at least genuine intellectual gropings, representing the first crude attempts to pass from isolated and empirical facts to general truths. It was the dark hour before the dawn, and for our craft at least, marked the beginning of a distinction which, in other arts, had long since been recognised by Greek philosophers between a *technique* or art of which certain rules were to be put in practice, and a science which, by a series of inductions or deductions, enunciated certain propositions showing on what

conditions the effect, which the art aims at producing, depends. While as an art, surgery, as well as medicine, long remained a calling apart—not always one of honour—as a science, its progress soon became inseparably connected with that of physiology or biology. Hence, its scientific history is that of the biological sciences, and surgery is scientific only as biology is scientific.

To an English physician, largely influenced no doubt by his Italian teaching, we owe the discovery of that, which is alike the starting point of scientific physiology and the central factor of practical surgery, viz., the circulation of the blood; but it is not a little remarkable, that that great and potent factor in surgery, the ligature, dates from a period a hundred years before Harvey's great discovery, a conspicuous example of the potential value of an isolated and empirical fact. And, yet again, in the use of anæsthetics, we have another such example of how prodigious and unexpected may be the influence exerted by purely accidental discoveries. Remove these two pillars of our craft, the ligature and the anæsthetic, and how much of the modern edifice of surgery would crumble down. So, too, who would have anticipated, in the early investigations and discoveries of Leeuwenhoek and Ehrenberg into microscopic organisms, the seed of that rich harvest which is now being reached in the application of theories of germs and of putrefaction not only to surgery, but to medicine, sanitary science, the economics of food and drink, and to many of our staple industries. Such illustrations as these, which accentuate the influence of isolated facts upon the progress of surgery, may seem to be contradictory to my general contention for the greater importance of scientific theories, but it is not really so. As an art, no doubt, surgery has been largely benefited by empirical discoveries; but *quâ* science, isolated facts—and the above are no exception to the rule—have no real and enduring value until their relations are determined and brought under the scope of general laws. Ambrose Paré, we have reason to believe, "attached a higher value to the efficacy of a *farrago* of boiled puppy-dog and earth-worms pickled in white wine as a cure for gunshot wounds—to learn the secret of which we are told he paid two years' court to a surgeon of Turin—than he did to the ligature;" and until the fact of the ligature came to be fitted in with the theory of the circulation, its use could only have been a subordinate factor in the art of surgery, and of next to no account in the science of disease.

The anæsthetic properties of various drugs have been known as facts from the time of the Egyptians, but until it was perceived that insensibility and the relief of pain might be made applicable to surgical procedures, and become closely related to their results, these were regarded as drugs more curious than useful; and so also, the early in-

vestigations into microscopic organisms were scarcely more than isolated zoological facts, until their relationship to the processes of fermentation and putrefaction came to be perceived.

All this may be perfectly admissible, aud yet this very unexpected outcome of isolated experiences should cause us both to have a profound respect for the potentiality of new facts, as well as to manifest our recognition of their possible value in the future, by faithfully recording them, so that, by-and-bye, we may have them at hand to fit into the theory which may hereafter be found to embody them. Then will they become an integral part of the body corporate of science, with its infinite powers of extension and adaptation to new facts and new conditions. It is lamentable to think how great a loss science must have sustained in the past, by reason of waste of opportunities of recording simple every-day facts.

We live now in an age of acute observation and systematic record, which bears constant fruit in the bringing to light of various symptoms and diseases too numerous to mention, of which formerly we had no knowledge; but, except perhaps in the case of some which doubtless are the evolved products of new and modern conditions, these must have existed for ages under our eyes. Some are so obvious and conspicuous that they must have been noticed by men whose work testifies that they were not lacking in acuteness and powers of observation; but yet, from the absence of any record in the past, we now labour under the disadvantage of having to approach them, fortified with the few facts of to-day, instead of with the accumulated experience of years; and we may depend upon it that, even now, owing to a simple want of observation and attention, and to an absence of a sufficiently systematic record of passing signs, we are daily committing the same sins of omission which we lay at the door of our predecessors.

It is an easy thing glibly to admit the close connection of medical with biological science, and the fact that year by year we lay increasing insistance on the biological part of the medical curriculum, is evidence that this connection is well recognised; but it is not so easy to define within the limits proper to this address, either the nature or extent of the influence of biological theories upon that which is still so largely and essentially a practical art. Such an attempt, however, I have rashly undertaken to make. If we are to forecast the future, we must realize the past, and the appreciation of what science has already done, and is now doing, for surgery is a necessary antecedent to the understanding of what its future lines of progress will be.

As the most striking example of the profound influence exerted by biological methods and reasoning on surgery with the happiest results, the mind turns naturally to those brilliant chemico-biological conceptions of the origin and causes of fermentation and putrefaction, that occupy so

much of our thoughts at the present time. There is a precision in their methods and a brilliancy in their results that speak for themselves, and constitute the best apology for the prominence which, with one accord, we extend to them. If these stood alone, they would be a standing monument to the labours of the biologist, and leave the surgeon for ever in his debt, permeating as they do the whole range of that chief part of the surgeon's work—wounds and their consequences, operations and their results; nay more, profoundly influencing, and even revolutionizing, all our past ideas of the ætiology of morbid processes.

The name of Lister is revered wherever the civilized surgeon dwells; antiseptics and asepticism loom large in the foreground of the picture of modern surgery; and yet, while we welcome the benefits, we must admit that, enveloped as it is in clouds of uncertainty and even misconception, the theory is far removed from finality. Hitherto, attention has been chiefly devoted to the magnification of the *rôle* of aerial germs, and the Listerian method has been chiefly devoted to their exclusion or destruction. A prodigious ingenuity in the multiplication of germicides, and an endless search after perfection in this direction, has probably tended to divert attention from matters of more vital and deeper import; and, in fact, the experience of many surgeons has shown that successful practice is possible without the exclusion of extrinsic germs. One distinguished member of our profession has observed, or almost boasted, and his practice is largely imitated, that he is in the habit of flushing the abdomen after section "with water containing spores and germs of thirty different kinds of beasts," and that his results are as good as those of the strictest disciple of Lister. This is of course the language of hyperbole, but still it is abundantly clear, that aerial germs are not the be-all and end-all of wound pathology. The *rôle* of the living tissues themselves is the one great unknown quantity. Why is it that some wounds are obnoxious to putrefactive changes, or to the absorption of harmful products, while others are less so, or escape unscathed in atmospheres and fluids that literally reek and swarm with germs? What subtle property of blood or tissues enables the field-mouse to resist the septicæmia which is so fatal to the house-mouse, or the white-cocooned silkworm the disease that devastates the yellow; or what constitutional peculiarity shelters the Cochin-China fowl from chicken cholera, or the Algerine sheep from anthrax? Why were the black pigs mentioned by Mr. Darwin unaffected by blood-root, which poisoned their white fellows, or only the white pigs poisoned by buck-wheat? Or, even amongst the race of man, what is the essence of these numerous racial peculiarities which here confers immunity, and there a special predisposition to certain diseases. All these and many other similar instances of idiosyncrasies of race and colour in respect of drugs and of diseases have

been recently set forth in an admirable address by Dr. T. Clifford Allbutt, and it is impossible not to see in this new science of comparative nosology, the beginnings of investigations which are bound to lead us to facts of the highest importance, both in the science and practice of our calling. In short, what is the value of the mysterious and unknown factor that has been termed "tissue resistance?" To say that this is a question which will be soon, if ever, accurately and fully answered, is to admit that by somewhat of a by-path we shall reach that ultimate goal of physiology—the realization of the essence of organic life, and he would indeed be presumptuous who would assume that this knowledge is in store for us. This is not the place to discuss such a question, but it is at least stimulating to the mind to be always keeping such a definite and crucial issue before it, and whatever failure there may be, and perhaps must ever be, to reach the comprehension of the great ultimate laws of life, it must surely be that facts of the highest practical value will be unearthed by him who will dig deeply into this scarcely opened mine of physiological action.

In such a connection, I cannot refrain from calling your attention to the very remarkable observations of Metschnikoff, which threw quite a new light upon the whole question of the capacity of tissues to resist the invasion and progress of morbid processes. Many of the results obtained by this observer have been confirmed by that accomplished observer, Mr. Sutton, who gives the following graphic account of events as read by the light of their experiments :—

"The story of inflammation may be likened to a battle. The leucoctyes are the defending army, their roads and lines of communications, the blood-vessels. Every composite organism maintains a certain proportion of leucocytes, as representing its standing army. When the body is invaded by bacilli, bacteria, micrococci, chemical or other irritants, information of the aggression is telegraphed by means of the vaso-motor nerves, and leucocytes rush to the attack; reinforcements and recruits are quickly formed to increase the standing army, sometimes twenty, thirty, or forty times the normal standard. In the conflict, cells die and often are eaten by their companions ; frequently the slaughter is so great that the tissue becomes burdened by the dead bodies of the soldiers in the form of pus, the activity of the cell being testified by the fact that its protoplasm often contains bacilli, &c., in various stages of destruction. These dead cells, like the corpses of soldiers who fall in battle, later become hurtful to the organism which they in their lifetime were anxious to protect from harm, for they are fertile sources of septicæmia and pyæmia—the pestilence and scourge so much dreaded by operative surgeons. The analogy may seem to many a little romantic, but it appears to me to be warranted by the facts."

We further learn from the researches of Metschnikoff, that when the white corpuscles first come in contact with bacilli in a virulent form, they are unable to touch them, but if they have been educated, so to speak, by having first had presented to them the attenuated form, they have afterwards no difficulty in grappling with the more malignant. If this be so, we get a long step nearer to a rational explanation of the *modus operandi* of vaccination, and of protective inoculation generally.

Nor can we shut our eyes to the importance of the recent researches on those alkaloidal products of putrefaction, or of normal physiological tissue activity, called by the somewhat barbarous name of ptomaïnes and leucomaïnes, for the knowledge of which, and especially for the distinction between the two kinds, we are largely indebted to Gautier. Intensely poisonous, continually being formed even in the healthy body, demanding constant excretion, the body seems to exist in constant peril from the foes of its own household, and it is possible that the retention of these products may be found to account for many hitherto unexplained phenomena. Already a fundamental distinction seems to have come out between the hyperthermia which attends poisoning by the physiological extractives and the hypothermia which is a feature of poisoning by the putrefactive alkaloids.

The pole-star of the efforts both of the biologist and surgeon is, the hope of a better understanding of the nature of these living actions; towards the much wished for goal we are travelling, the one along the broad road of normal processes, the other along the more crooked path of abnormality and disease. To the biologist belongs the credit of having discerned that his road lay through the cellular theory; to the surgeon a timely discrimination in having quickly perceived that the track taken by his fellow-traveller—the biologist—was in the right direction. Thus, the establishment of the cell theory was quickly followed by a cellular pathology, and henceforth, the two paths slowly converge, and if ever they meet and coalesce, it will be in the solution of the ultimate problems of organic life; but it may also be that these two paths represent the familiar mathematical conception of two lines which are continually nearing one another, but which, even if prolonged to infinity, will never meet.

I think that we surgeons may often scarcely realise the important bearing which this cellular theory and pathology bears to the science of surgery, inasmuch as its establishment signalizes that holy alliance between physiology and pathology, to whose fruitful union we owe the all-important generalisation, that morbid processes are but perturbations of those of health; and that to comprehend therefore the abnormal, we must first understand the normal, not forgetting that the converse may

be true, in that the abnormal may sometimes shed an unexpected light upon the normal.

What thoughtful and conscientious surgeon is there who is not deeply sensible of the opprobrium which rests upon his calling, as well as of his own impotence, for his incapacity to arrest the ravages of cancer, and of those tumours we call malignant, in acknowledgment of their baneful progress; how ignorant are we yet of their real origin; how unable even to state bald but incontestable facts as to their infectiousness or hereditary descent. True it is, that neither any theories of cells or germs have yet enabled us to answer these questions; nevertheless it is plain that, whether we regard cancer as due to the vagaries of cell growth, or to the running riot, so to speak, of the activities of primordial protoplasm, independently of cell growth, or with whatever theory we approach the question, it must be to a better understanding of the normal processes of living tissues that we must look for the explanation of this terrible example of aberration from them. What boasted triumph of operative surgery, indeed, could compare with such a knowledge of the causes of these activities as would enable us to forefend the direful consequences of this, it is to be feared, increasing scourge of humanity?

There are few questions of greater importance to the surgeon than that of inflammation; kept within bounds, his best and surest ally; but, running wild riot, his most dreaded enemy. Ignorant of its nature, origin and causes, our treatment of it has hitherto been hardly better than a rule of thumb; and yet, nothing seems more clear than that the whole process may be expressed in terms of perturbed nervous action, and heightened tissue metabolism; the conditions determining which it is permissible to us to think might possibly be determined, averted, or attacked with scientific precision. Already, I think, we have made some distinct advances in this direction, and I am confident that the physiological basis on which we are proceeding is at last sound and rational.

It is, as we know, often unwise to prophesy, but such a conception as that just stated raises in the mind visions of what may be some important lines of advance for our calling. We surgeons are sometimes in the habit of indulging in not a little self-glorification at what we have done for the assistance of our medical brethren, by the importation of surgical procedures into what, by an artificial distinction, have been considered as medical diseases. Physicians will, I am sure, ungrudgingly acknowledge the great assistance they have thus received; but there is a way in which medicine may reciprocate, and repay with interest its debt to surgery. Its professors and practitioners may make themselves responsible for more rational and precise methods in pharmacology and therapeutics. For too long has the whole of our profession,

physicians as well as surgeons, rested under the stigma of being mere empirical administrators of drugs, or exponents of a haphazard poly-pharmacy. There has been too much truth in the observation of that scorner of physic, who compared nature and disease to two men fighting, and the doctor to a blind man with a club, who strikes in, sometimes hitting the disease, and sometimes hitting nature. But there are signs of great improvement. Already in the case of curare, atropine, muscarine, physostigmine, pilocarpine, strychnine, veratrine, cocaine, and some other drugs, notably those termed antipyretics, we see the dawn of better days for pharmacology and therapeutics. There is a degree of precision in their application, and of accuracy in the effects produced, that augurs well; and, in the case of some of these drugs, there is an encouraging approach to knowledge of physiological action of a precise kind that was undreamt of not long ago. As Professor Huxley has stated the case, "there can surely be no ground for doubting that, sooner or later, the pharmacologist will supply the physician with the means of affecting in any desired sense, the functions of any physiological element of the body. It will, in short, become possible to introduce into the economy a molecular mechanism which, like a very cunningly-contrived torpedo, shall find its way to some particular group of living elements, and cause an explosion amongst them, leaving the rest untouched."

There is yet another fertile but as yet almost untilled field of research for the surgeon, as well as for the physician, which, if it is to yield its harvest, must be dug with biological tools. What do we know about that great factor in disease—hereditary influence, and its laws? Almost nothing; and yet we cannot doubt that the laws of evolution, of which heredity is so great a factor, are as applicable to disease as to health. That mysterious influence which stamps the offspring with resemblance to its parent, cannot be supposed to be confined only to face and form, or to mind and morals. It must extend to all organs alike. If there is a family heirloom in faculty and feature, there will also be a *damnosa hæreditas* in liability to disease; but saving that in a vague and general way we recognise that there is some sort of liability existing for certain diseases, such as gout, phthisis, malignant tumours and deformities, to be transmitted, we can make very few definite statements concerning the extent of such liability, still less can we formulate any quantitative laws which regulate their transmission. Although it is scarcely likely that we shall understand the intricacies of pathological heredity until we have a better understanding of its normal or physiological aspects, there is, notwithstanding, but little doubt that bright and discriminating side-lights, revealing facts and clues of high importance, may be thrown upon the whole general question of

descent by instances of the transmission of deformities and disease, just as in that very difficult and obscure subject of nerve physiology, the experimental method has received much elucidation from pathological observations. Now, the whole question of heredity, with its inextricably interwoven factors of anatomical, physiological, psychological, and pathological effects, is of such enormous import, both to the human race in general, and to our own profession in particular, as bearing on the transmission of actual disease, of liability to special disease, or whatever expression we may adopt to describe something we do not very well understand, that it behoves medical men, who alone as a class are in a position, and who, by their education, are especially fitted for the task, to contribute and accumulate facts which are calculated to throw light upon a subject of such importance. This is only one of the many ways in which collective investigation in Australia might be turned to the best account, and might supplement similar labours elsewhere.

By methods, singularly ingenious and painstaking, Mr. Galton, while always begging for co-operation from the medical profession, has set us an example of how this kind of research may be successfully carried out on statistical principles; and I believe this Congress might, with the greatest advantage, set on foot a scheme that would in the end result in the accumulation of a vast amount of well observed and well recorded facts, without which assuredly there will be no recognition of the general laws of which we are in search. Not only are these questions of heredity of immediate importance to us as practitioners, but it is impossible to forget how great a factor it is in the great law of evolution, perpetuating and fixing, as it were, the variations of organic life; and assuredly the time may, and I think will, come when we shall have to ask ourselves whether that mighty force is ever to drive us before it like dead leaves, or whether rather, we have not the knowledge and the power to direct and regulate its influence for the benefit of our race, as we have already been at some pains to do for the beasts of our fields.

To talk now of evolution under any aspect, would lead me far beyond my mark, but there is no doubt that a wholly new and often unexpected light is thrown upon many pathological products, such as tumours, deformities, and abnormalities, by reference to their mode of origin from structures that are, so to speak, relics of inferior organisms or of early conditions which, by their survival or re-appearance, stamp us indelibly with the mark of our lowly origin. Labours, such as those of Sir James Paget and Mr. Sutton, have made us fully alive to the abundant harvest of facts to be gathered from this wide and neglected field of comparative pathology.

I am well aware, Mr. President and Gentlemen, that the facts which I have been permitted by your forbearance to relate, however interesting and important they may be in themselves, do not, as thus crudely and badly stated, constitute an answer to the inquiry which stands at the head of this address. I have not been desirous of shirking that issue; but I felt that I should approach it better if the ground were cleared by a sort of preliminary survey of some points which, I hope, are not without a distinct bearing upon the main question. And, being thus now in some way fortified, I propose to attack that question to the best of my ability.

It has been often said that there is no ideal science except that which is exact, or in other words, which can be submitted to the control of number, weight, and measure, and the statement is perhaps correct, but it is not true that there is no science except that which is exact. If this were so, the domain of science would be narrowed down to mathematics and portions of physics and chemistry; nay more, we should have to despair of bringing much knowledge, that we now rightly count as scientific, within such a definition. For instance, with the most sanguine expectations, it is to say the least of it doubtful whether the primary and fundamental facts of biology, and of the numerous branches of knowledge which proceed from that great parent trunk, can ever be satisfactorily submitted to such tests. But short of this, we may have science both in substance and in method. As in the case of M. Jourdain's prose, it sometimes comes as a surprise to people who have looked upon scientific knowledge as differing *toto cœlo* from the ordinary knowledge of every-day life, to learn that there is no such difference, and that such knowledge as they themselves possess, which is based upon accurate observation and logical deduction, is truly and genuinely scientific. Science, in fact, is not a mode of knowledge *sui generis* and it employs no methods which are exclusively its own. Its difference from the ordinary knowledge of every-day life is one of degree only, in respect of the greater extent and complexity of its range, and in the exactitude of its methods and deductions. Just as in nature, *nihil fit per saltum*, there is no sudden transition from one kind of knowledge to the other, but the higher and more developed form has grown out of the other by a gradual and rational process of evolution, which is ever continuing and ever widening in its range. Still, if it be permissible to mark off roughly epochs in this gradual process, one may recognise three stages in the growth of a science. In the first place, there is the collection of a number of accurately observed, well attested and carefully recorded facts, obtained by experiment or otherwise. Then comes the the detection of the genuine and constant element pervading the facts, in other words, the determination of the law which covers and includes

them. Lastly, there is the verification of the law, by its application to new facts. To these three stages we may in the case of the ideally-exact sciences add a fourth, that of quantitative determination, or subjection of the facts to the criterion of numbers, weight, and measure.

With such a definition of the nature and aims of science, there can be no hesitation in admitting the claims of both medicine and surgery as deserving of the name; and the degree to which it is deserved will depend entirely upon the extent to which the specified conditions are fulfilled. In the preceding remarks, the attempt has been made to draw attention to some lines of promise, along which certain progress has been made in the directions demanded by this scientific exigency, and which offer good hopes for further advance. Thus, in the isolated and often fragmentary details—which, for the most part, constitute the sum of our knowledge—of extrinsic and intrinsic germs; of the history and behaviour of cells and tissues generally; of the possible influence of autochthonous toxic products of tissue activity, or of the physiological action of drugs; of inflammation and of hereditary influence, we may perceive many undoubted and substantial facts, and even scattered portions of great biological laws which, if developed to their fullest extent, should cover the whole knowable range of vital activities. Of the existence of these laws we are dimly sensible, but we see them only *per speculum et in enigmate.*

Of the terrible gaps in our knowledge even of elementals, of its lamentable shortcomings, of its failure even to approach completeness in any one direction, no one can better admit than ourselves, who suffer not only scorn and reproach from others, but also the severer sting of our own conscious ignorance. Still, I think we may take heart of grace, and look hopefully into the dim and misty future. All along the line there has been great and manifest advance. Never was there a more devoted and enthusiastic band of labourers in the field; never, by training and education, were these better fitted for the great work before them; never was that work more penetrated by the scientific spirit of the age, of which the watchwords are—observation, experiment, deduction, and verification.

It is with pardonable pride that one finds one's-self justified in turning to the latest development of modern surgery, in illustration of this growing tendency towards calculated accuracy and precision both in method and result, which are the qualities on which its scientific character essentially depends. Everyone will anticipate me in referring to the recent remarkable achievements in the surgery of the brain and spinal cord.

Based upon a large variety of facts, drawn partly from accurate pathological observations, partly upon a series of oft-repeated experiments of the biological laboratory, certain deductions are drawn

which enable the surgeon to calculate, with a truly scientific precision, the locality of certain lesions. The accuracy of his anatomical knowledge, which perhaps more nearly than any other of the biological sciences represents an approach to our ideal science, enables him to define, with still greater accuracy, regions of the brain or cord which correspond to the seat of the anticipated disorder. Whatever be the real truth lying at the bottom of our theories of germs and putrefaction, there is, at least, no doubt that, in the aggregate, the adoption of modern methods have enabled these, amongst other dangerous regions of the body, to be explored and attacked with a minimum of risk of the ordinary surgical calamities, and the maximum of hopeful prospect of recovery.

Here, indeed, is food for hope; here is a bright exemplar of the happy results accruing to the art of surgery by the adoption of the methods of science; and though the measure of success already achieved in the directions indicated may be both absolutely and relatively small, as compared with the life-saving work that has been done in other regions which present less intrinsic difficulties, the character of the results obtained are of the highest importance, as indicating what can be done and what must be the manner of our work.

If I have selected brain surgery as the latest and perhaps, as yet, the best tribute to the beneficent influence of science, I must not be thought unmindful of those other great benefactors of our profession and of mankind, whose work has, in a like manner, been made what it is by their overmastering sense of the importance of accuracy and precision. The triumphs of abdominal surgery have been often sung, and I can do no more now than offer, to those great masters of our craft who, happy in their generation, have lived to see their labours crowned with success, the tribute of a renewed assurance from their Australian disciples, that they will ever be remembered as the acknowledged pioneers and leaders in the van of scientific surgery.

It might, perhaps, have been my duty, Mr. President and Gentlemen, to make some excuse for the extreme biological bias of a surgical address, did I not understand that it was not desired to make a difficult position more difficult by restrictions as to subject matter. This being so, I will make no apology if the exigencies of my thesis have caused me to dwell almost exclusively upon those conceptions of all pervading law and order which, as I have endeavoured to show, have both determined the present condition of surgery, and alone offer us almost unlimited hopes for its future progress. It may be perhaps, that in dwelling with insistence upon the biological aspects of surgery, I risk the charge of a theorizing transcendentalism, from some of my surgical brethren who, not without reason, pride both themselves and their

calling on their eminently practical character. It is impossible, however, not to contrast the great possibilities for the improvement of surgery as a science, that would be suggested by a better knowledge of fundamental biological and pathological laws, with the more circumscribed sphere of action offered by the expectation of increasing the range of our operations. The finality of surgical art was the main text of an address by Mr. Erichsen not long ago, for which he was somewhat severely taken to task by his critics; but I cannot help sharing his opinion. As Mr. Erichsen points out, there is no artery in the body on which it is possible to put a ligature, which has not been tied with every sort of material; every limb has been amputated to its highest limits; almost every joint has been re-sected which it is physically possible to re-sect; no abdominal organ that has not been attacked with the knife, either for complete or partial removal, or at least for incision; bones are re-sected, sutured, transplanted, and so are nerves; larynx, thyroid and lymphatic glands are freely removed. No longer are brain and spinal-cord sacred from interference; indeed, here is perhaps our most promising field for an extension of the range of surgery, as distinct from its methods. In intra-thoracic surgery, too, surgical interference has been pushed, and with admitted advantage, almost to extreme limits.

Now, I am not saying that absolute finality even in the scope of our operations has actually been reached, but we cannot conceal from ourselves that we are within a measurable distance of it. As far as anatomical and physiological possibilities are concerned, we must have nearly reached the limits of our art. New worlds there doubtless are to conquer in the realms of surgery, but these can scarcely be found in the, as yet, untouched portions of the human frame.

So, too, as to the manner of our operating. It can scarcely be possible to make much improvement upon the careful methods of precision adopted by our greatest masters, and taught by them to every student who is willing to learn. Every reasonable, nay almost every practical, way has been suggested for reaching every vessel or organ which is to be approached; modification after modification of various operations has been described with the most careful minuteness of detail, and with the less satisfactory result of burdening our surgical nomenclature with a host of barbarous names that is positively bewildering. As a striking example of this multiplicity of methods, I have the high authority of the President of the Ophthalmological Section of this Congress for saying, that there are at least forty ways of extracting a cataractous lens, that have been described and claimed as new and distinct operations. A very wealth of ingenuity has been expended in devising new instruments, new splints, new germicides, new ligatures, and new dressings, without number. All along the line, there has been no doubt great and manifest

improvement in the *technique* of surgery, but there has been much also that is simple change, begotten of the restless spirit of our age; and we should be careful to remember that change is not always progress, and that in surgery, as well as in fashion and function, there is a tendency to cyclic recurrence, of which it would be easy to mention other examples besides that of the present remarkable and profitable revival of supra-pubic cystotomy.

In speaking of a possible approach to finality in the range of surgery, we are dealing with that which must necessarily be limited by the hard and fast structural and functional facts of anatomy and physiology; but, it is more hazardous to suggest similar finality in the *technique*, because so many of the manipulative details in the practice of surgery are inextricably associated and interwoven with its science. In our own time, we have had many opportunities of seeing what fundamental importance mere manipulative details may assume; as, for instance, in the case of brain-surgery, ovariotomy, extirpation of the uterus, spleen and kidney, and in the operative treatment of hydatids, where all the difference between frequent failure and brilliant success has been made by alterations of simple technical procedures which, in fact, are but the practical embodiment and application of biological truths that have been consciously, if only partially, perceived, or it may be, have been unconsciously anticipated. If indeed we exclude from the practice of surgery all that has a direct reference to scientific principles, whether recognised or not, we have left to us an art which differs only in degree from that of our forefathers.

All this is merely saying, in another way, that the real and great development of surgery in the future depends upon the extent to which the true relations of physiological and pathological facts can be ascertained and made available; but it is also implied that, if surgery is to be placed on a sound footing, there must be a close connection between the practical and scientific. If there is a danger for Australian surgeons it is that, under the busy and active and often restless circumstances of our lives, there is a strong temptation to neglect the latter, a mistake which is fatal to improvement. We live, it must be confessed, in a world in which pure science receives little in the way of honour or emoluments, save that internal consciousness of well doing, which is glibly represented to be its own and sufficient reward; and under the chilly atmosphere of neglect and disregard, any sacred fire of science with which our education may once have inspired us, is apt to smoulder and die out. Partly for this reason, but partly also because the management of set details, and of the routine of our art, calls forth so much less of our much prized energies than the hard bending of the mind to laws and principles, there is a strong tendency for us to neglect

the refining principles of science, without which surgery is so apt to degenerate into quackery and rule of thumb.

Nor can we hold our training in the past as wholly blameless, for we must be conscious how much greater store we learned in our student days to set upon the thaumaturgic proceedings of the operating theatre than upon the less brilliant, only because less evident, work of the laboratory and post-mortem room. Now, we know that the glory of the most brilliant of operators pales before that of the man of science. And, where we find eminence both in surgery and science combined in one and the same individual, it is for the latter, rather than the former, that we deem him great. No name stands higher in the annals of surgery than that of John Hunter, the freshness of whose imperishable fame age cannot wither,

"Nor custom stale his infinite variety."

But when, on each occasion of the pious tribute to his memory in that splendid institution which he founded, we survey his life and labours, we realise more and more that if John Hunter, the surgeon, was great, John Hunter, the physiologist and man of science, was still greater.

If, indeed, there be in us a natural tendency to subordinate principles to practice which, if not encouraged, was to say the least of it, not sufficiently sternly repressed in our past training, we should take warning, and see that we do not perpetuate the evil in those whom we are educating to follow us. Bearing this always in mind, we may look with hopeful confidence to the effect of our medical schools, of which we may be proud ; and in this connection, I cannot refrain from offering a tribute of admiration to the success which has followed the zealous and energetic efforts of our Victorian hosts, who, being first in the field, have been closely followed by our common friends in Sydney, and still more recently we, in Adelaide, have endeavoured to follow, not unworthily, in their steps. So long as we adhere to the high standard, which I think we have all wisely adopted, we may hope not only that the true scientific spirit will be inculcated and fostered, but also that, by serving as rallying points for all that is best in our profession, our schools will conduce to an active and healthful *esprit de corps*, whose watchword is—*thorough.* If there are some, as there undoubtedly are, who only see hopelessness in the chance of a successful medical career for a large proportion of our alumni, to such critics I would answer—it may be that the struggle for existence in our own profession is as severe as in others ; all cannot succeed in it, and many will be disappointed ; but there is this immense countervailing advantage, namely, that no training can be suggested which offers a better, or even so good, training of the mind—such a technical education, in the best sense of the term, of eye, ear, hand and muscles ; in short, such an all round equipment both of suggestive

and useful knowledge, and of the means and methods of acquiring more of it than does the curriculum of our own profession. Surely, as a *means* of education alone, a medical training is worth a great deal, not to speak of the intrinsic value of the facts acquired, or of their usefulness and adaptability in all climes and countries.

So, too, I might speak of the good influences in the same direction that may be exercised by these Congresses, and by our local medical societies, in co-ordinating and directing the efforts of individuals, and in collecting and registering the results of their scattered labours. And while we should be undoubtedly improving ourselves, we may also cherish the high hope and laudable ambition, that our united efforts may contribute something, be it ever so little, to the growing store of human knowledge, and to that science of medicine and surgery which, owning no nationality, yet serves all humanity in its endeavour to alleviate the ills to which it is the heir. An ambitious effort perhaps in these days of progress, but neither presumptuous nor hopeless; for, though we, in far Australia, labour under the great and manifest disadvantages of being widely separated from the active centres of intellectual life of the older countries, and are deprived of the magnetic personal influence of the master minds of the age, our very isolation is not without certain advantages of its own. Tradition and ancient usage bear not upon us with so heavy a hand. The perspective afforded by our distant point of view brings into prominence, in sharp outline in the foreground, much of that which is best, and enables us to discern and discard, perhaps quicker than some of those who are nearer to their origin, doctrines and practices that are reaching their vanishing point. Of practical enterprise, as becomes a young and vigorous race, there is no lack. Save in brain surgery good work has been done in almost every department, and here also a promising beginning has been made. The facts recorded in Dr. Pinnock's paper in the Transactions of the last Intercolonial Congress, on "Ovariotomy in Australia," are a substantial proof that the general average of our surgical work is, to say the least of it, respectable. As a profession, we possess the inheritance of a sturdy independence, which let us take heed we do not imperil by our invitations for Government patronage and protection. We have the splendid opportunities afforded by the special circumstances and conditions of our country, for the much-prized privilege of initiating new work, as well as of throwing new light upon old questions. Do we make the most of our opportunities? If we have not hitherto done so, these Congresses are an earnest that we have awakened to our duties and responsibilities. Of the value of our work, it will be for others to judge.

But, Mr. President and Gentlemen, I must be mindful of the wholesome, if unpalatable, advice given to us Australians by a distinguished Englishman. That advice was, as we remember, "Don't blow," and I

feel it is just possible that, in thus dwelling upon our advantages, upon our hopes and prospects, I might find them good enough and bright enough to lead me into temptation.

It is not so pleasant, but it is a wholesome exercise, for members of a profession whose conscious motive is, above all things, a sincere desire that, in the march of progress, there should be no deterioration of their moral and scientific fibre, to ask themselves occasionally whether that position of independence and isolation of which I spoke just now, in reference to its advantages, is not also at the same time fraught with attendant danger. It is impossible that, in the restless sea of progress, there should not be rocks ahead for all who belong to the craft of surgery; but it is worth more than a passing thought to consider whether, with so great a separation from the steadying example and influence of the great master-minds of our profession, and with so great a distance from the head-centres of scientific thought, there is not for us here a special danger, lest we fall into those mental and moral snares with which the practice of our profession is everywhere beset. Lest, in fact, we mistake enterprise for progress; lest we be too little prone to correct that unconscious mental bias which, with such cheerful optimism, leads us to confound recovery with cure; lest we do not sufficiently restrain that *nimia diligentia medicorum* which, with fatal facility, glides into that which a great surgeon, with warning voice, has termed a *prurigo secandi*, and that again into a veritable *furor excisorius*; lest, too, in seeking to build up a school of Australian surgery, we do not ever keep before our eyes those solid pillars of our craft—accurate knowledge, infinite painstaking, and sacred reverence for human life, that constitute the splendid traditions and still guiding principles of British surgery.

And now, Mr. President and Gentlemen, I fear that whatever indulgent consideration you may have been disposed to extend to me has been severely strained. I am conscious, deeply conscious, that in the treatment of a difficult theme, I have fallen short, even of the moderate degree of competence of which I had the temerity to believe myself possessed, when asked to undertake this address; but I shall be satisfied, if there should be considered aught of fitness in its unmistakable exhortation, that we study the science of life and of disease while we practice our art of healing. Here, and here alone, lies the promise of a progress unbroken which is limited only by the bounds which are set to the understanding. "The day is short and the work is great, the reward also is great; it is not incumbent upon thee to complete the work, but thou must not therefore cease from it." Thus spake an ancient writer of an ancient race, whose stern admonition towards a high ideal of duty is yet tempered by a just appreciation of human power, and a reasonable regard for human weakness.

LAPAROTOMY, WITH REMARKS UPON SOME OF THE INJURIES AND DISEASES WHICH MAY RENDER THE OPERATION NECESSARY.

By Sydney Jones, M.D.

When the Executive of this Congress did me the honour to ask me to read a paper upon some surgical subject of prime importance and wide interest, I acceded to their request with much diffidence. When, however, I called to mind the fact, that I had had the great advantage of being an eye-witness and a close observer of the operation of laparotomy, as performed in numerous cases, and under varied conditions, by some of the great masters in this department of our art in Europe—Knowsley Thornton, Lawson Tait, Granville Bantock, Meredith, Martin of Berlin, Thiersch of Leipsic, and others not quite so distinguished, and that I had myself had some experience in abdominal surgery—remembering these things, I say, I thought it might not be altogether unprofitable if I passed in review the operation itself, and then briefly discussed some of the conditions which call for its performance. I shall not attempt to describe in detail the various procedures of which I shall make mention ; I shall dwell only upon those points which I regard as of especial importance, or which have attracted my particular attention. In this paper, therefore, I make no pretension of giving an exhaustive account of all or any of the procedures involving a laparotomy. My aim is to discuss some moot points in the operation, and thereby, to elicit the opinions and experience of others. I feel assured that there are a great many valuable clinical facts bearing upon this subject, as upon others, stored up in the minds of many of our professional brethren, which have never been put upon paper, and which I hope my feeble remarks may be instrumental in calling forth. If I succeed in doing this, my paper will not have been written in vain. It will, I think, be admitted by all, that my subject is second in importance to none in the whole domain of surgery. It is certain that the operation of laparotomy has saved more lives during the last decade, than any other surgical procedure. More than this, the splendid successes which have been achieved have given impulse and encouragement to surgeons to invade other regions of the body, heretofore held still more sacred from the surgeon's knife than the peritoneal cavity itself. It cannot but be that—with the possibilities of more precise diagnosis which physiological research, more perfect pathological knowledge and closer clinical observation hold out to us, aided by the improved mechanical methods suggested by scientific and inventive genius—the saving of life during the next decade will be much greater than it has been in the past. Upon the same diagnostic certainty, arrived at by the same methods, will depend the possibility of still further extensions of the application of the operation of laparotomy. I believe that in coming years the peritoneum will be more frequently opened, with the view to the prevention of disease ; that lesions of the hollow viscera will be more frequently treated surgically ; that aneurism of the abdominal aorta and its branches will be exposed by abdominal section, and treated like aneurisms of the limbs ; that displacements of the

uterus will be remedied by direct manipulation of the organ through an abdominal incision, and that polypi and other diseases of its cavity will be treated by direct incision of its wall, as has, indeed, been done already in one case by Martin, of Berlin; and that the appendix vermiformis, as proposed by F. Treves, will be removed for recurrent typhlitic symptoms. All these will, without doubt, become ordinary procedures. It may, perhaps, not be unprofitable here, to sketch briefly the rise and progress of the operation of laparotomy. Such a sketch will, at anyrate, serve to show how an operation, foreshadowed by the most advanced minds, but condemned by the majority, has ultimately become of universally acknowledged benefit.

The Operation.

Of the incision, it is scarcely necessary to say more than that the median will be found the most generally useful in the great majority of cases, and certainly should be selected in *all* cases where the exact situation of the lesion cannot be ascertained. It is evident, however, that in many cases it will be best made laterally, and it may need to be vertical, or transverse, or oblique. That site which will enable the surgeon most readily to reach the part to be operated upon should be selected; but, other things being equal, the median should be preferred. The wound being less deep at the linea alba, there is greater facility in manipulating the abdominal contents. In most cases also, I think the incision at the middle line will not need to be so long as when placed laterally. According to Ashhurst, muscular wounds in the abdomen are likely to lead to hernia, and we should therefore expect that ventral hernia would be more likely to occur after an abdominal section through muscle, than when made at the linea alba. My own limited experience, however, tends to the opposite view, namely, that hernia is more likely to occur after incision in the middle line. An observation made by Dr. Hagon-Torn, in *Centralblatt für Chirurgie*, No. 35, 1884, gives support to my view. He found in a case of ventral hernia, after laparotomy, in which the abdomen had been opened in the middle line, but in which a cut had also been made in the rectus muscle, that the cicatrix in the muscle was quite firm, and the linea alba had yielded. No doubt this inconvenient sequela of the operation is, in most cases, due to insuffficent care in taking up one by one all the layers of the abdominal wall when introducing the stitches. It is generally agreed, that the length of the primary incision should not be more than two to two and a half inches. This affords sufficient room to insert two fingers, and make such an examination of the parts within, as will enable us to decide upon the nature of the lesion or disease, and the best proceeding to be adopted. An incision of this length will be long enough for the removal of many ovarian and all parovarian cysts. If found necessary, it can of course be readily prolonged, and it will be better to do this than to bruise the edges of the parietal wound by dragging, as I have sometimes seen done, a semi-solid growth through an aperture far too small to admit of its easy extraction. When the parietal peritoneum is found to be adherent to the parts beneath, the usual plan of prolonging the incision upwards, until a part is reached where no such adhesion exists, is the best. A long incision is infinitely less disadvantageous than the delay and injury caused by

stripping the parietal peritoneum from the abdominal wall, a mistake which I have seen committed on more than one occasion, when the above mentioned rule has been neglected.

Absolute hæmostasis.—The importance of checking bleeding, during all stages of the operation, cannot be too strongly urged upon the young operator. The surgeon of large experience in abdominal operations may, perhaps, afford to neglect absolute hæmostasis until just before opening the peritoneum, but the inexperienced one should never do so. The flow of blood renders the different structures difficult of recognition, thereby prolonging the operation, and adding to the risk. Especially is it important to stop all bleeding in the case of patients in whom the layers of the abdominal wall are matted together, owing to a previous laparotomy, and in whom, also, adhesion of the intestines to the parietal peritoneum is likely to be found. It is exactly in this last condition that free hæmorrhage is met with. I am firmly convinced that the slipping of a ligature has, in many cases, arisen from the imperfect manner in which it has been tied by the slippery blood-stained hands of the operator. Here, in passing, I should like to emphasise the value which I attach to irrigation, which keeps the fingers of the operator clean, and washes away all traces of blood. It is reasonable to suppose, that the saturation of the ligature with blood increases the risk of septic infection. We all regard it as of the highest importance to sponge or wash away all traces of blood from the peritoneal cavity, and yet perhaps we are indifferent to the retention of some of that fluid in the meshes of our ligature. Infiltration with blood of the tissues of the abdominal wall, contiguous to the line of incision, also increases the risk of septic infection, as well as the formation of abscess in the parietes. To assist in obviating this infiltration, and at the same time to prevent disturbance of the planes of tissue and retraction of the cut edge of the peritoneum, it is, I think, a good plan to pass a ligature through either side directly the peritoneum is opened. These ligatures also enable the assistant to hold the edges of the wound apart during the further progress of the operation.

Flat sponges.—The peritoneal sac being opened, warm flat sponges should be brought into as extensive use as possible. For isolating the part to be operated upon; for protecting the bowels and other viscera from unnecessary handling and exposure to the carbolic spray, if that be employed; for sopping up blood and other fluids, and for shutting out the large absorbing and sensitive surface of the peritoneum, and thus obviating the risk of carbolic acid poisoning and shock—for all these purposes, flat and warm sponges are most useful. I am confident, from observation, that they are not made as much use of as they should be. By their use, also, is obviated that prolonged final sponging of the peritoneal cavity which we sometimes witness.

Clamping bleeding vessels and adhesions.—It is scarcely necessary to urge the propriety of not waiting to tie vessels or adhesions, but to clamp them until the operation is completed. Many vessels will then be found not to require the ligature, the compression of the forceps having been sufficient permanently to stop the bleeding. I make mention of this practice, because of its bearing on the duration of the operation—an important element in the immediate mortality of many cases of laparotomy.

Washing out.—The removal of the tumour, or the repair of the injury having been completed, the question arises, shall we wash out the abdominal cavity? Lawson Tait advises and employs washing out as preferable to sponging, which he thinks involves the risk of rubbing off the epithelium when the peritoneum is inflamed, and also increases the risk of conveying septic matter into the body of the patient. If there has been much escape of blood, of the contents of a tumour, of pus, of fæcal matter, or if the peritoneum has been fouled in any way, there can be no question of its necessity. But in the absence of these conditions, the opinions and practice of different operators vary. For my own part, in perfectly simple cases, say of cystic ovarian disease, I have avoided washing out as unnecessary and meddlesome, but when extensive adhesions have been separated, or large raw surfaces opened up, as in the enucleation of tumours, or when there is troublesome bleeding from numerous oozing points, then I think it is imperative to employ it. There can be no question, that washing out the peritoneal sac with a large quantity of hot water, at a temperature of about 105° Fah., exercises a hæmostatic influence, and it is believed also to be an efficient agent in counteracting shock. I have thought that perhaps hot weak saline solutions would have a still more powerfully restorative effect, in the same way as saline intravenous injections have been found serviceable in collapse from loss of blood.

Artificial ascites.—This is perhaps the best place to discuss the suggestion first made, I think, by Prof. Peter Muller, of Berne, viz., that of producing an artificial ascites after laparotomy, with a view to prevent adhesion of coils of intestines to one another, to other viscera, or to the parietal peritoneum. There is but little doubt, that the adhesions just mentioned are the common cause of the tympanites and vomiting, which so often occur after the operation, and it is possible that the separation of the coils, brought about by the fluid, in which they are made to float, may help to prevent the formation of such adhesions. The slow absorption of the fluid would also assist to counteract shock. The suggestion is certainly worthy of consideration, but I am not aware that it has been acted upon to any large extent. My friend, Dr. Walter Brown, of Parramatta, so long ago as the year 1878, with the same object in view, in three cases of ovariotomy, poured warm carbolic oil, 1 to 40, into the abdominal cavity, and moved it about freely among the intestines. He also filled the cavity with the same fluid, before closing the abdominal wound. The drainage tube was not used; all were successful. Mr. Knowsley Thornton has also, I believe, used carbolic oil for the same purpose. The adoption of this plan will probably be limited to those cases in which adhesive peritonitis has existed before the operation, and the peritoneal covering of the intestines is sticky.

Drainage tube.—Before closing the abdomen, we have to decide whether we shall, or shall not, use a drainage tube. In some cases the necessity is obvious, as when the peritoneum has been fouled, or when broad adhesions have been separated, and oozing of blood continues from numerous small points, which cannot be secured. Tait says that the tube is a most useful hæmostatic. In other instances, it is often difficult to come to a decision. We have to gauge the absorbing power of the peritoneum, which varies in degree in different conditions, and in

patients of different ages. In an aged patient, the power of absorption is less than in a young one, other things being equal. The use of a tube, besides the risk of pressure on, and injury to, the viscera, adds to the risk of septic infection, and weakens the abdominal wall at the point of exit, and should be avoided when possible.

Sutures.—I do not think it matters much whether we use Chinese silk, silkworm gut, or silver wire stitches to close the wound, provided that we are careful to take up each layer of the parietal wall. The thicker the cicatrix the better, as the less liability will there be to subsequent ventral hernia. Silver wire stitches, with coil and shot, undoubtedly possess the advantage that the stitches can be readily relaxed if the tension should become great. I saw Prof. Thiersch pass wire button sutures quite two inches from the edge of the wound. These when tightened up brought together broad surfaces of peritoneum, and had the effect of projecting the line of incision above the level of the surrounding skin. Such an adhesion of peritoneal surfaces would, I imagine, be likely to give way as soon as the stitches were removed, and would therefore offer no advantage, except in protecting the superficial sutures from strain.

Dressings.—Dry absorbent dressings are admitted by all, I think, to be the best. In the after-treatment, the question of feeding by the mouth will depend in some measure on the nature of the lesion for which the operation has been performed. In a case of bowel lesion, for instance, no prudent surgeon would allow his patient anything more than ice to suck, or a few teaspoonfuls of water to drink for the first forty-eight hours, whereas in a simple case of ovariotomy, liquid nourishment may be taken at a much earlier period. Rectal feeding in all cases should be employed for some days, and I must confess to a preference for peptonized home-made enemata, to the more solid nutrient masses which pharmaceutical ingenuity has given us.

Opium and Aperients.—Until within the last ten years, it was the almost invariable practice to keep the patient for several days under the influence of opium. Lawson Tait in England, and Dr. T. M. Baldy in America, have opposed this practice, and maintained the advantage of administering saline aperients after the second or third day, unless the bowels have been moved spontaneously. They regard this treatment as specific against the tympanites, vomiting, and pain, which we so frequently meet with a few days after laparotomy has been performed. Tait says—"I always find that as soon as a motion has been passed, the symptoms of distension, vomiting, elevated temperature, and quick pulse rapidly disappear." Dr. Baldy says—"Logically, salines are infinitely better than opium. We are taught that opium puts the bowels 'in splints,' and in this manner keeps the peritoneal surfaces from rubbing together and increasing the inflammation. But the bowels are already in splints, as it were, and anyone trying to make them move will be quickly convinced of this fact—therefore, for this purpose, opium is superfluous. The drug relieves the pain, it is true, but oftentimes it does not even do this, except in enormous doses. Relief of pain is practically all that opium can do for good in peritonitis. It, however, does a world of harm—it helps to keep the bowels in splints, and so favours the formation of those great masses of adherent intestines which we find so often the cause of subsequent intestinal obstruction; also the

formation of numerous bands of organised lymph, which as often bring a patient to one in after years. Still worse, it closes all the avenues of escape for the poisonous products of inflammation formed in that great lymph sac, and in this manner, supplies material the best possible for keeping up and spreading the inflammation, much more surely than the rubbing together of the parietal and visceral peritoneum will. With salines, on the contrary, the bowels are kept in active peristaltic motion, and this very motion tends to prevent the formation of adhesions and bands—they literally drain the peritoneal cavity of all products of inflammation. This is not merely theoretical, but has been repeatedly observed." Dr. Gill Wylie advocates enemata for the relief of tympanites, vomiting, and pain ; and if these fail, a quick purgative. This question of the administration of salines and aperients bears upon that which I discussed a few minutes since, namely, the production of artificial ascites. I opine, that the peristaltic action of the bowels serves the same purpose as the artificial dropsy—preventing adhesion—in the one case by causing the intestines to alter continually their relative positions ; in the other, by keeping them asunder with a layer of fluid. No doubt salines have also the effect of promoting absorption of fluid from the peritoneal cavity, and of carrying off septic matters. In my own practice, the custom has been to administer, per rectum, only a moderate dose of opium immediately after the operation, to relieve pain and shock, and to give no more unless the pain should become continuous and severe, the bowels being relieved with enemata.

When to Operate.

In all injuries and diseases of the abdominal cavity where operation is entertained, there are always special circumstances which influence our decision as to the proper time to operate ; but there are also some general considerations common to all forms of disease and injury of that region, which may now be mentioned. I may say, by way of preface, that the introduction of the antiseptic method has modified, in a remarkable degree, the views formerly held as to the best time to operate. And when I speak of the antiseptic method, I mean everything calculated to secure absolute cleanliness, and therefore, the prevention of access of pathogenic germs into the wound, as well as the employment of germicides. It was reasonable, that when the operation of laparotomy involved great risk to life, that it should be delayed as long as possible, and only performed as a last resort. When that risk became greatly reduced, postponement to a late date in the course of the disease was no longer proper. I venture, however, to say —though in saying it, I am aware that I shall run counter to current opinion—that in the case of ovarian and other tumours, there is still some advantage in waiting for a time until the peritoneum has become accustomed to the presence of the growth. There is, I feel convinced, some value in what may be called the "apprenticeship of suffering." Previous suffering, provided it has not been excessively severe or prolonged, does, in my opinion, in some way prepare the nervous system for a severe operation. In fat subjects, delay also is advantageous, for the difficulty of the operation in them is increased by extreme deposit of adipose tissue in the abdominal wall, and in the cavity of the

belly. In them also, the risk of septic absorption is increased, owing to the unavoidable disturbance of the fat cells, and the escape of free fat into the abdominal cavity. In the following conditions, however, laparotomy should be performed without delay :—

(1) In acute general peritonitis arising from injury, or in the course of disease.

(2) In any case in which blood, pus, urine, or any foreign matter has escaped into the peritoneal cavity.

(3) Where urgent pressure-symptoms, especially those affecting the heart, lungs, or kidneys, arise.

(*a*) Dr. Bedford Fenwick has well pointed out, that the most common cause of sudden death after laparotomy for ovarian, renal, or cystic disease of the abdomen, is fatty degeneration of the cardiac muscle, with thinning of the walls of the right ventricle, and dilatation of its cavity—effects directly due to the powerful upward pressure of the increasing cyst, pressing upon the afferent and efferent vessels of the heart and upon the lungs; interfering in the one case with its blood-supply, and in the other, bringing about deficient oxygenation.

(*b*) Rapidly-developing bronchitic irritation, or dyspnœa, due to pressure upon the lungs and pleura, or due to hydrothorax, though the last named may, of course, be temporarily relieved by paracentesis of the pleura. The grave bronchitic trouble, with profuse purulent expectoration, which sometimes arises from the pressure of the rapidly-enlarging ovarian cyst, was well illustrated in my first case of ovariotomy, performed eighteen years ago. It was so severe, as to cause considerable anxiety as to the condition of the lung substance, and as to the propriety of operating at all. Twenty-four hours after the operation, the cough and expectoration had entirely disappeared.

(*c*) Rapidly-increasing albuminuria, from pressure on the renal vessels, is a manifestly urgent cause for immediate operation; as also is direct pressure on the ureters, producing symptoms of suppression of urine.

(4) Where there is great and rapidly-increasing emaciation.

(5) Finally, where the patient is of advanced age, if operation is to be done at all, it should be done without delay. Cardiac degeneration is much more likely to ensue in a patient suffering from ovarian tumour of large size when over forty years of age, than when younger.

The general contra-indications to laparotomy are those which pertain to the performance of all major operations, namely, extreme collapse from injury, injuries to other parts which must necessarily prove fatal, very advanced disease of the kidneys, heart, or lungs.

Pregnancy, although adding somewhat to the risks of laparotomy, is by no means a contra-indication. Many ovarian tumours have been removed during pregnancy, which has, nevertheless, gone on to full term; and I have myself seen the abdomen opened in a case of suspected extra-uterine fœtation, when the condition proved to be normal, and no ill result followed. Hereditary tendency to insanity should carry some weight, as a contra-indication to ovariotomy, in a case where the

advantages and disadvantages of the operation are otherwise pretty equally balanced. Cases of madness following the operation have been recorded by Barwell, Keith, Thornton, Bryant, Alban Doran, and myself. It is true that all recovered their sanity, though in some, as in the case recorded by me, not for many months after the operation.

Laparotomy has been performed for gastrotomy, gastrostomy, pylorectomy, ruptured intestine, punctured and incised wounds of the intestine, gunshot wounds of intestines, rupture of liver, rupture of spleen, rupture of large blood-vessels, rupture of urinary or gall bladder, rupture of uterus, ruptured tubal pregnancy, perforation from typhoid ulcer, abscess, intussusception, acute intestinal obstruction, chronic intestinal obstruction, tuberculous peritonitis, purulent peritonitis, hydatids, hydro-, hæmo- and pyo-salpynx, Cæsarian section and Porro's operation, removal of spleen, nephrotomy and nephrectomy, cholecystotomy, oophorectomy and removal of the appendages, hysterectomy, enucleation of fibroids and cysts, ovarian and parovarian cysts, cysts arising from dilatation of a patent urachus, extra-peritoneal cysts of unknown origin, cysts of the mesentery and omental cysts, lipoma of omentum, aneurism of the abdominal aorta and its branches, and finally, for exploratory purposes.

Gastrotomy.

Gastrotomy, for the removal of foreign bodies from the stomach, has now been performed several times with success—the incision in the wall of the viscus being closed with Lembert's, or the continuous suture. With far less success, as might be expected, but still with some encouragement, it has been done with a view to dilatation of the orifices in cases of cicatricial structure. Professor Loreta, of Bologna, originally proposed and performed the operation with this object, and a few others have followed his example.

Gastrostomy.

Gastrostomy has now been performed in a large number of cases for obstruction of the cardiac orifice of the stomach, or of the œsophagus—malignant or cicatricial. The mortality in the malignant cases has been high, but in the cicatricial as low as 29 per cent. If done in the early stages of obstruction, the mortality is much less than if deferred to the later. A painful death by starvation, at any rate, is obviated. The fatal issue in the malignant cases has been due to the spreading of the disease which rendered the operation necessary.

Several methods have been adopted of fixing the stomach in the abdominal wound. This may be done by double suturing, after Howse, by hare-lip, or acu-pressure or safety pins, or by pressure forceps, the blades of which are covered with indiarubber, and the handles stitched to the abdominal wall. By the last mentioned method we avoid puncture of the walls of the stomach, but I think, from observation of two cases in which the forceps were used, that close contact of the gastric and parietal peritoneum is not so perfectly secured as by sutures or hare-lip pins.

Whatever plan we adopt, we must be careful not to open the stomach before pretty firm adhesions have been formed. This mistake I saw

committed on two occasions, both cases proving fatal within a few days. The exhausted condition in which these patients usually are before operation, and their low vitality, render the process of inflammatory adhesion slower than it would be in a healthy individual. This same state of exhaustion also makes the surgeon anxious to open the stomach at the earliest possible moment, in order that stomach feeding may be commenced. To meet this difficulty, I would suggest the advisability of injecting milk or other liquid nourishment into the stomach by means of an aspirating syringe. The minute puncture made with the needle is at once closed by the bulging into it of the mucous coat of the organ, and all leakage is prevented. This injection may be commenced immediately on the conclusion of the first stage of the operation of gastrotomy, and repeated every few hours as may be thought necessary, until firm adhesions have taken place. If rectal feeding be combined with the plan of injection just described, the patient would be well sustained until such time as it was thought to be perfectly safe to open the stomach. The adoption of this plan will also render unnecessary that which English surgeons at any rate regard as very undesirable, namely, immediate opening of the stomach.

Pylorectomy.

Pylorectomy is only practicable when the pyloric end of the stomach is quite movable, and the lymphatic glands in the neighbourhood are unaffected by the disease. When these contra-indications exist, duodenal or jejunal gastrostomy should be performed. Indeed, there is a growing tendency to substitute one or other of these operations for pylorectomy, in all cases of malignant disease of the pylorus.

Contusion and Rupture of the Intestines.

The difficulty of diagnosing simple contusion, from rupture, is great. The symptoms of shock are undistinguishable from those of collapse from loss of blood. In simple contusion, it is manifest that delay is desirable, as the patient may recover without any operation, if the injury be not so severe as to lead to subsequent sloughing of the bowel. In rupture, delay will probably be fatal.

The history of the injury may sometimes give us a clue. Should the abdomen become universally tympanitic, we know that gas has escaped into the peritoneal cavity, and that rupture has taken place. Emphysema of the subcutaneous cellular tissue also, from escape of gas into that structure, at a part where the bowel is uncovered by peritoneum, will give us the same information. As far as I can ascertain, not a single case of recovery, after laparotomy for ruptured intestine, has taken place. There are probably two reasons for this, exclusive of shock—First, that in consequence of the difficulty of making a correct diagnosis, the operation has been too long delayed; and secondly, that in consequence of bruising of the bowel beyond the actual site of rupture, necrosis is apt to occur, with extravasation of the intestinal contents. Probably the best practice in all cases of rupture, except those situated very high up in the alimentary tract, is to establish an artificial anus, thus avoiding the risks of extravasation, and affording the bruised bowel below the anus absolute rest, and a better chance of escaping

necrosis. Enterostomy also occupies so much less time than suturing, or resection, that it obviates the risk of a prolonged operation—a most important matter in the cases we are considering, where shock is so conspicuous a feature.

I cannot but think that putting aside shock, the tendency to subsequent gangrene of the gut, in the cases in which the bowel has been sutured and returned, explains the remarkable difference in the mortality of laparotomy for this lesion, and that for stabs and punctured wounds of the intestine, where the recoveries are about 66 per cent.

Gun-shot Wounds of the Abdomen Involving the Viscera.

Much difference of opinion has been expressed as to the propriety of probing gun-shot wounds of the abdomen which may possibly involve the underlying viscera. When done carefully, and by an experienced hand, I can see no objection to such a proceeding. Valuable information as to the direction the missile has taken through the abdominal cavity may be acquired—for that direction will usually be the same as that of the track through the abdominal parietes. Further, I see no objection to laying open the track if it be not very extensive, and so ascertaining with certainty whether the peritoneum has been punctured, and also obtaining some definite information as to the probable track of the bullet through the peritoneal cavity.

When the direction of the missile renders it probable that one of the fixed viscera (and in this class I include the large intestine) has been injured, incision directly over the site of the organ will probably be the best. On the other hand, when that direction would indicate that the movable viscera, and especially the jejunum and ileum, have been involved, then I think the median incision should be chosen. If it be impossible to ascertain the probable direction, then also, the linea alba should be selected.

Perforating ulcers of the bowel, when due to foreign bodies, gall stones, or burns of the skin, demand immediate laparotomy, if the diagnosis can be made. In typhoid and tuberculous ulcers we have, in most cases, to deal with patients already greatly exhausted by the disease, and with a large tract of intestine, if not actually involved in ulceration, yet in a condition which renders healing, after a plastic operation, most unlikely to occur. Under such circumstances success cannot be expected. When perforation occurs during convalescence, and especially when it occurs in those cases of mild typhoid, which my old teacher, Dr. W. H. Walshe, used to call "peripatetic," then laparotomy will afford the patient a fair chance of recovery.

In perforation of the appendix vermiformis, we are beset with the difficulty of deciding whether we have to deal with actual perforation of the appendix, or with a typhlitis. Could we, with certainty, differentiate these conditions, our proper course of action would be clearly defined. Early operation in cases of perforation is our duty, whereas the vast majority of the cases of typhlitis will get well under judicious medical treatment alone. By judicious, I mean the absolute avoidance of all purgatives, with rest, and liquid nourishment in very small quantity. Late operation may be needed in some cases of perityphlitis, owing to suppuration in the cellular tissue of the iliac fossa. When this does occur, the retro-peritoneal operation should be performed. In all other

cases, when operation is required, incision directly upwards from about the middle of Poupart's ligament will usually afford the readiest access to the affected parts.

Since writing the above, I have read the report of a discussion introduced by Dr. Bull, of New York, at the Medical Society of London, on the surgical aspects of typhlitis and perityphlitis. Dr. Bull opened the abscess extra-peritoneally in ten cases, and they all recovered. He advocates the use of the exploratory needle to determine the presence of pus. Dr. Bull, Mr. F. Treves (of London), and Dr. Weir (of New York) expressed the opinion, that in all cases in which abscess forms, there is perforation of the appendix.

Dr. Bull concluded his paper with the aphorism, that the risk of operation was less than the risk of waiting.

Intussusception.

It is, I think, clear that the great fatality, which has until within the last twelve months followed the operation of laparotomy for intussusception, has been due to the fact that it has been put off until a late stage of the disease—that, in fact, it has been looked upon as a proceeding to be adopted only as a last resource. I entirely agree with Mr. A. E. Barker, of University College Hospital, London, who contends that, as in an ordinary case of hernia we are always prepared to operate upon the failure of the taxis, so in intussusception, when failure has attended the efforts at reduction by inflation, injection, and inversion of the body, we should be prepared at once to do laparotomy. The longer we wait, the more surely will the case become one of "strangulation," instead of being, what it is in the early stage, one of "incarceration." Strangulation existing, reduction of the invaginated portion of gut will be probably impossible. To trust to the possible recovery of the patient by the perilous process of sphacelation, and casting off of the strangulated intestine, is unjustifiable. The recent remarkable diminution of mortality, which has attended abdominal section for intussusception since this rule has been followed, gives strong support to the justness of Mr. Barker's view.

Chronic Intestinal Obstruction.

Division of adhesions or bands, enterostomy and resection of the intestine, are the methods which have been ordinarily adopted for the relief of chronic intestinal obstruction. Mr. Lawford Knaggs has proposed a fourth method, namely, union of the gut above the obstruction with some portion of the tract below it, the part of the bowel involved in the obstruction being left *in situ*.

When adhesions are extensive, and it is found impossible to separate them, or where the cause of the obstruction cannot be discovered, enterostomy will probably be the best procedure, Mr. Lawford Knaggs' method, just mentioned, being followed if the obstruction be high up in the small intestines, so as to obviate the escape externally of the contents of the upper part of the tract, and the rapid wasting and death by inanition, which such loss invariably brings about. The exhausted condition of the patient also may be so great that a rapid operation is necessary, and then enterostomy will be the best method.

Mr. Lawson Tait deprecates any prolonged search being made for the cause of the obstruction, and practises enterostomy in a large number of cases of obstruction. Whatever may be the explanation of the way in which enterostomy cures, practically it is found that evacuation of the intestinal contents, and the resulting relief of distension, do, in many cases, remove the obstruction, and it becomes possible to close the fistula subsequently without any return of the symptoms, the lumen of the bowel being apparently quite restored.

Abscess of Liver.

In abscess of the liver, incision through the right linea semilunaris, stitching the capsule of the liver to the wound in the parietal peritoneum, or if there be no need to hurry, stuffing the wound with carbolised or sublimate gauze to excite adhesion, opening and drainage, constitute the plan ordinarily and successfully adopted. I should not have alluded to it, but to point out that sometimes, owing to the position of the abscess, it is found difficult to secure free drainage. When this is likely to be the case, the suggestion of Kartulis should be borne in mind, namely, that of re-secting portions of one or more ribs. The manifest disadvantage attending this plan is, that the diaphragm will frequently have to be cut through, and if there be no adhesions, there is danger of the pus entering the pleural sac. In one case of hydatid cyst of the liver which came under my observation, and which was treated in this way, infection of the pleural sac actually occurred.

Stitching together the diaphragmatic and costal pleuræ, if possible, before opening the abscess or hydatid cyst, and thus shutting off the pleural cavity, would probably obviate this danger.

Tumours of the Kidney.

The battle of the lumbar and abdominal methods, for the removal of kidney tumours, is still unsettled. Mr. Knowsley Thornton strongly advocates the abdominal method ; Mr. Morris is a warm supporter of the lumbar. In course of time when we become capable of more precise diagnosis, we shall probably find that tumours of a certain size, nature, and position, will be best removed by the one method ; whilst tumours, presenting the opposite characters, will be best dealt with by the other method.

The lumbar method, avoiding as it does all interference with the peritoneal cavity and its attendant risks, naturally disposes us to select it if at all practicable, especially if our experience of abdominal surgery has not been large. On the other hand, it has special risks of its own, and the most serious of these, and a necessarily fatal error is, that of removing the only kidney which the patient possesses, or the only one which has functional activity. The abdominal method enables us to examine the opposite kidney to that upon which we propose to operate, and thus to avoid a most lamentable mistake. Recently, in witnessing the post-mortem examination of the body of a medical man, whose case I had had several opportunities of observing from his boyhood, the risk of which I am now speaking was strikingly demonstrated. For some years he had had a pyelitic swelling on the right side, of calculous origin, no tumour having been noticed on the left side. We found the left kidney completely saccular, all renal secreting tissue having dis-

appeared. The tumour on the right side consisted of the dilated pelvis of the kidney, with saccular dilatation of a considerable part of the organ itself, which however, still had a large portion of its excretory structure unaffected—manifestly, this kidney was the only one that had been doing any work for some years. Had removal been proposed, and the lumbar method selected, the surgeon would certainly have operated on the right kidney, and thereby cut short the patient's life. Still more recently, another illustration of the advantage of the abdominal method came under my observation. An hydatid tumour of the right kidney was diagnosed, and although its most prominent and accessible part was in front, still, as it could be pushed well back into the loin, the surgeon proceeded to operate from the lumbar region. The ascending colon was found to be so closely and firmly attached to the tumour, that it was impossible to incise the latter without risk of injuring the bowel. A laparotomy at the right semi-lunar line was then made, and at once the surgeon came upon the cyst wall, which he stitched to the parietal wound, opened, evacuated the daughter cysts, and introduced a drainage tube. It is true that, during the progress of the lumbar operation, it became doubtful whether the tumour was connected with the kidney at all; but the possibility of mistake as to the exact seat of the growth is another argument for the abdominal method. Where there is a hydro or pyonephrosis bulging into the loin, no doubt the best plan is to incise and drain from that site. Subsequently, should removal be required, and the tumour have become shrunken, lumbar nephrectomy may be practised, if there is reasonable probability that the opposite kidney is sound. Should there be any doubt about this, or the tumour be still of large size, abdominal section should be performed, both kidneys examined, and either the trans-peritoneal of Terrier, or the retro-peritoneal method of removal, be adopted. The cut end of the ureter may either be attached to the parietal wound, or preferably in some cases brought out through a puncture in the loin, and stitched to the skin in that situation. If after opening the abdomen in any case, it be found that removal from the loin offers the greatest advantages, a hand in the abdominal cavity, steadying the kidney, will much facilitate the proceeding.

Myoma of the Uterus.

In the treatment of fibroids of the uterus, five plans are open to us, exclusive of the electrolytic. Each of these will be appropriate in certain cases:—1st, treatment by drugs; 2nd, removal of the appendages; 3rd, enucleation; 4th, hysterectomy; 5th, ligature of the pedicle, and return of the stump, as in ovariotomy. The last mentioned will only be applicable in the case of pedunculated tumours, and then but rarely. The medical treatment cannot be considered here, but I may say in passing, what perhaps some surgeons are apt to forget, that much may often be done by dieting, especially abstention from animal food and alcohol, and also by the aid of drugs. In a large number of cases, no other treatment is required. Removal of the appendages has been frequently practised for intra-mural bleeding or painful myomata. It is often found to be impossible of execution, owing to the large size of the tumor, and the impossibility of bringing the ovaries to the surface. In cases also in which the fibroid is found to be undergoing cystic degeneration, removal of the appendages has proved useless. When practicable,

this proceeding should be practised in preference to enucleation or hysterectomy, as involving less risk to life. It is of importance to apply the ligatures as close as possible to the uterine wall, and thus to diminish the blood supply as far as practicable. I have witnessed two cases of intra-peritoneal enucleation of fibroids of the uterus, and the proceeding was in both cases a formidable one. In one, as many as fifty pairs of Kœberlé's forceps were in use at the same time, compressing the mouths of bleeding vessels. Only when the fibroid is extra-mural, and either non-pedunculated, or with a very broad and short pedicle, is enucleation likely to be attempted; and the large raw and readily absorbing surface which is left, constitutes a risk which is probably greater, in most cases, than that incurred in performing hysterectomy. Provision for very complete drainage is also necessary. The only case illustrating the fifth method of dealing with fibroid which I have seen, was one of Mr. Thornton's, the pedicle being of good length, and neither broad nor thick. The temptation to treat it like the pedicle of an ovarian cyst was too great to be resisted. It was transfixed with a double thread tied in the usual way, and the tumour cut away. The cut edges of the peritoneum around the stump were drawn together by the glover's stitch; the stump itself was allowed to drop back into the pelvis; the abdominal wound was completely closed, no drainage tube being used; the patient made a perfect recovery. Rarely will the condition of the pedicle be such as to permit of its being treated in the manner just mentioned; its shortness, fleshiness, and vascularity forming usually insurmountable obstacles. When, however, it is practicable, the advantages which it affords are manifest, and should not be lost sight of.

The fourth mentioned method, is that of complete hysterectomy. Removal of the uterus and the tumour has been practised with much success by Dr. Granville Bantock, to whom in England is due in large measure the established position which the operation has acquired. There are two accidents which may occur in the performance of the operation, and which need to be carefully guarded against—one is, the wounding of the bladder; and the other, division of one or both ureters, which are often closely applied to the surface of the tumour. I have several times seen the bladder in great danger of being included in the wire of the serre nœud, and in one case the fundus of that organ was so included, and cut away. The simple expedient of keeping a catheter in the bladder, whilst the wire is being adjusted and tightened up, will serve to prevent such an untoward accident. If we bear in mind the fact that the ureters are liable to injury during the operation, we shall be little likely to damage them. Such an accident, if unrecognised, would assuredly foul the peritoneal cavity. The open end of the uterine cavity, or canal of the cervix, should be thoroughly cleansed by some antiseptic application, then the cut edges of peritoneum should be drawn together over the top of the stump by a continuous suture, in the same manner as the mouth of a bag is closed by a string. The area of cut surface is thus reduced, septic infection is less likely to occur, and shrivelling of the stump itself is favoured; shreds of dry antiseptic gauze form the best dressing. The application of some powerful styptic or antiseptic to the cut surface of the uterine stump is, I think, dangerous. There is always risk of some of it passing down by the side of the stump into the peritoneal cavity.

It may surprise you to hear that I have nothing more to say respecting the removal of ovarian cystomata. A good deal of what has been already said applies largely to ovariotomy, but that operation is so well understood, and has been so well nigh brought to perfection, that I think it unnecessary to occupy your time, already too much trespassed upon, in discussing it. I shall only say that to a wider-spread knowledge of the ill results of tapping—ill results often shown by the formation of adhesions, and by infection of the peritoneum with papillary growths—to a more precise diagnosis, and to a more complete asepsis, we must look for a still greater reduction of the already small mortality.

UPON THE TREATMENT OF SO-CALLED TROPICAL ABSCESS OF THE LIVER BY FREE INCISION AND STITCHING OF THE ABSCESS-WALL TO THE LIPS OF THE PARIETAL WOUND.

By John Davies Thomas, M.D. Lond., F.R.C.S. Eng.

I have ventured to invite the attention of the Members of the Congress to the histories of three cases of abscess of the liver, which are here briefly reported, partly because, at any rate in my experience, this disease is rare in the southern parts of Australia, and partly because, to the best of my belief and knowledge, the treatment adopted in these cases is rarely, if ever, carried out in India and other tropical countries in which the disease in point is very common and fatal.

For the notes of the following case, I am indebted to Dr. Toll, of Port Adelaide, under whose care the patient in question was during the whole of his serious illness. The detailed notes of the case have unfortunately been lost, and those recorded here are, on that account, somewhat incomplete. My personal knowledge of the case is limited to an examination immediately before the operation, and to the performance of the operation itself, in company with Drs. Toll and Lendon :—

Case I.

W. B. B., aged 28, was admitted into the Port Adelaide Hospital on October 2, 1887. The patient had lately returned from the Kimberley goldfields, Western Australia, and during his residence there he had suffered great privations, and had had several attacks of ague. After an illness of several weeks' duration, he came under the care of Dr. Toll. At this time he complained of feverishness, pain in the hepatic region, incessant vomiting, cough, and profuse night-sweats. His temperature ranged from 99° to 103°.

Upon examination, the liver was found to be greatly enlarged in area ; there was considerable bulging in the hepatic region ; there was also troublesome cough without expectoration, and with no evidences of cardiac or pulmonary disease ; vomiting was almost incessant.

On October 2, I saw the patient in consultation with Dr. Toll, when we arrived at the conclusion, that there was an enormous abscess of the liver present. The correctness of the diagnosis was confirmed by the

introduction of an aspiratory needle in one of the lower interspaces in the right axillary line; it was also decided that immediate operation was called for, in order to anticipate a speedy rupture probably into the lung. An incision was made over the fifth intercostal space, the pleura was opened, and the diaphragm was found not to be adherent to the costal pleura near the wound. It was then cautiously divided to the extent of about two inches, when the surface of the liver showed itself, *there being, as far as could be ascertained, no adhesions beween the diaphragm at this spot and the surface of the liver.* An exploratory needle was then inserted into the exposed liver tissue, and pus was reached immediately. Two strong curved needles were now passed so as to transfix the wall of the abscess in two parallel lines about two inches apart; by means of the needles, two stout loops of aseptic silk were carried through the abscess wall, so as to loop it up firmly against the edges of the parietal incision; the wall of the abscess was then divided to the extent of about three inches, and the escape of pus into the peritoneal and pleural cavities was prevented by bringing the liver surface firmly up to the sides of the wound. An enormous quantity of thin blood-stained pus, amounting probably to several pints, escaped; the cavity of the abscess was gently but carefully cleansed with sponges introduced by long forceps, &c.; a large drainage-tube was carried to the bottom of the cavity, and the usual antiseptic dressings were applied. The entire operation was carried out under strict antiseptic precautions, including the use of the spray.

For several days after the operation, pyrexia, cough, and perspirations continued; the dressings were changed twice daily, the drainage-tube being removed occasionally to be cleansed. About the 16th day, the drainage-tube was finally removed, and on the 21st day, he was discharged from the hospital; ten days later, the wound had entirely closed. When admitted into the hospital his weight was 9st, when discharged 10st 7lb, and when he was last heard of, he was at the goldfields of the Transvaal "in splendid health," and weighing 14st 9lb.

Case II.

W. J. D., aged 38, labourer, was admitted into the "Alexandra" Ward of the Adelaide Hospital, on September 22, 1888. Born in North America, he has visited many parts of the world, and has often been in tropical latitudes; two years of his life were passed in a ship off the China coast, but for many years past he has lived in Australia. Twelve years ago he had an attack of dysentery which lasted for three weeks, and ten years since he seems to have had a mild febrile illness, for which he was treated at the Adelaide Hospital for about ten days. He dates his present illness about eight weeks back, when pain referred to the lower end of the sternum, the right hypochondriac region, and the right shoulder, came on. A fortnight prior to his admission into the Hospital, he thinks that he caught cold, at any rate, he began to spit up blood daily, and he estimates that he has since continued to expectorate every day about half-a-pint of blood-stained matter.

On examination, he was found to be a somewhat spare man, anaemic, and of sallow complexion. There was distinct bulging in the right hypochondriac region; the intercostal depressions at the lower part of the right chest were obliterated, and the subcutaneous veins in this

region were unusually evident. In the right nipple and parasternal lines, dulness commenced at the fourth rib, and thence extended vertically downwards to a point about two inches below the costal margin. In the right axillary line, the upper line of dulness was at the level of the nipple; posteriorly, resonance was deficient everywhere below the spine of the scapula, whilst absolute dulness appeared two fingers' breadth below the scapular angle. Over the entire right lung, the respiratory murmur was weak, but not otherwise altered in front; posteriorly, the respiratory murmur was not only weak, but was accompanied by a coarse, sub-crepitant râle, possibly friction. Vocal resonance and fremitus were practically normal. On the left side of the chest nothing abnormal could be discovered, except a slight displacement of the apex beat to the left; there was present also a double basic murmur. In the right hypochondriac and epigastric regions there was a distinct tumour, which projected moderately; its surface was smooth, elastic, but not fluctuant. Jaundice was absent. No discoverable enlargement of the spleen. An exploratory puncture in one of the lower interspaces yielded blood-stained pus.

September 27th, 1888.—Operation by Dr. Davies Thomas, assisted by Drs. Way and Lendon. An incision about three inches long was made a little above the sixth rib, and parallel to it; at its posterior end another incision about an inch and a half in length was made at right angles to the former one; both were carried down to the rib. When bleeding had ceased, a piece about two inches long of the sixth rib was excised; the periosteum, however, having been previously stripped off. Some slight difficulty was encountered in the removal of the piece of rib, in consequence of the existence of anchylosis between the fifth and sixth rib, for a small space at the place of operation; no reason for the anchylosis was discovered. The costal pleura was now exposed, but had not been opened. An exploratory needle was inserted into the abscess, in order to obtain full assurance that it lay at the bottom of the wound; this being satisfactorily ascertained, two strong curved needles, firmly set in handles and armed with double loops of strong aseptic silk, were passed through all the intervening structures deeply into and through the abscess, so as to include about two inches of the wall; the needles themselves were then withdrawn, leaving two loops of silk by which the abscess could be firmly brought up to the parietal wound, and held there by an assistant. The loops of silk were inserted parallel to each other and to the edges of the external wound; the wall of the abscess was then freely incised between the loops of silk which lay about an inch apart. Thick tenacious pus escaped slowly from the large opening made, and the cavity of the abscess was carefully cleansed by antiseptic injections, and the cautious use of sponges introduced by means of strong forceps, &c. As adhesions were found to exist between the surface of the liver over the abscess, and the parietal peritoneum over the diaphragm, and the pleura, it was not necessary to use many sutures for the purpose of securing the wall of the abscess to the parietal wound, but as a measure of precaution, two were passed through the wall of the abscess and the over-lying liver, and the lips of the external wound. The original opening into the abscess cavity was found to have been made at about the middle of the cavity, and as I considered it unfavourably situated for drainage, I made a counter-opening in the

eighth interspace, in the axillary line, and inserted a drainage tube in each opening. The wall of the abscess was rough and irregular, and the interior was partially divided into an upper and lower segment, by a kind of ridge of liver substance. The operation was performed under the usual antiseptic precautions, including the use of the spray The dressing consisted essentially of a pad of wood wool enclosed in antiseptic gauze.

It would be tedious to report in detail the subsequent history of the case ; it will suffice to state that the temperature fell at once to normal, and remained so ; that the cough and expectoration, which before the operation was incessant, ceased ; that the pad was changed twice daily for four days, after which one dressing sufficed for each day ; that on the fifth day the sutures were removed, and that the drainage tubes were dispensed with, the upper one on the 14th day, the lower one on the 19th day.

Finally, it is reported that on the 28th day, the wounds had entirely healed, and the physical signs in the right lung were normal.

Case III.

I am indebted to the kindness of my colleague, Dr. Way, for permission to publish this case, and to Dr. Aitken, the House Physician of the Adelaide Hospital, for the notes appended :—

G. T., aged 38, at present and for some years past a miner, but formerly a sailor, was admitted into the Adelaide Hospital, on Oct. 23, 1888, under the care of Dr. Way. He complained of diarrhœa and dysentery of six weeks' duration; this was associated with abdominal pain and occasional vomiting. He had sustained a compound fracture of the left leg eight months previously, and from this he had hardly recovered when his present illness befell him. For two years past he has lived in the Barrier Gold Fields District.

Upon examination he was found to have an enlargement of the liver, the dimensions of which were as follows :—In the right nipple line from the fourth interspace, as far as two inches below the right costal margin ; in the median line from the cardiac dulness, to about two inches above the umbilicus ; in the right axillary line, the upper line of dulness was at the sixth rib ; and behind in the right scapular line, the dulness began at the eighth rib. There was slight bulging of the lower interspaces over the hepatic region, but no redness of the skin or fluctuation. Jaundice was absent. An exploratory puncture in the seventh interspace, in the right axillary line, yielded pus near the surface.

November 2, 1888.—Operation by Dr. Way, assisted by Dr. Thomas. Incision, with re-section of a piece of the eighth rib in the right axillary line ; pleural cavity opened, there being no adhesion of the diaphragm ; loops of silk passed through the diaphragm and abscess wall ; the latter was then freely incised, the contents evacuated, the edges of the incision in the wall stitched to those of the parietal wound, and the cavity was carefully cleansed.

In this case, Dr. Way made an opening and inserted a drainage tube for the pleura in the seventh interspace, about two and a half inches away from the opening into the abscess, the object being to prevent infection of the pleura by the discharge from the abscess during the

after-treatment. The opening into the pleura at the site of the original incision was closed by stitching up the wall of the abscess all round the edges of the parietal cut.

The subsequent history of the case may be briefly stated. On the eighth day the sutures were removed; on the eleventh, the pleural drain was dispensed with, as no discharge came through it. Until the eighth day, the temperature rose to about 100° in the evening, and then fell to normal.

At present, November 14th, the patient may fairly be regarded as convalescent.

CONGENITAL PHIMOSIS AND ADHERENT PREPUCE.

By Geo. Talbot Woolley, M.R.C.S. Eng.

Hon. Surgeon, Castlemaine Hospital.

Before going into the technical details of my paper, I cannot help asking my professional brethren, and especially those with large midwifery practices, to pay a little more attention to the formation of the infant, especially with reference to the penis, and to instruct the nurse how to act, in case all is not as it should be, and to utterly ignore any stupid opposition which may be met with, either on the part of the parent, or the nurse; for I find that the greatest ignorance exists amongst the parents and nurses, as to the proper formation of a baby boy's foreskin.

In almost every instance, on a medical man being informed that the infant is feverish, fretful, and always crying, he, as a rule, suggests that there is something wrong with the diet, and that the little one is suffering from the wind, or some other popular complaint of infancy, and various suggestions are made, without any material benefit; but if you enquire more closely, you will often find that the child wets his napkin almost incessantly, that his penis is almost perpetually in a state of erection, and that the water, which is sometimes very high in colour, stains the napkin yellow; and if you look, you will find that the prepuce is so tight that it is impossible to see the lips of the meatus, which, when they are exposed, will be found to be in a state of congestion. In such cases, measures should be adopted to gradually stretch the orifice of the prepuce, and see if there are any adhesions, and if there are, the morbid conditions will be commensurate with the extent of the adhesions and the age of the child; for it will be remembered, that at a very early age the glandulæ odoriferæ begin to secrete a quantity of badly smelling caseous material, and this being, by the adhesions, prevented from being washed away, has to find a habitat for itself, and gradually, but surely, buries itself in the surface of the glans penis, or the under surface of the prepuce, and sets up a definite form of constitutional disturbance; the origin of which I generally have had to arrive at by a series of negative deductions, until I began gradually to recognise symptoms peculiar to this condition.

In enumerating these symptoms, I would like to draw marked attention to one, which to my eye is pathognomonic of this disease, viz., an expression or aspect of the face, more noticeable in children of from two to eight years of age, which gives it a peevish or peaky look ; the skin has a shiny, dry, cracked look about it, and there are generally some sores about the nostrils and corners of the mouth, which are quite typical and different from the common herpes following cold ; and so great an impression has this characteristic face made upon me, that I rarely, if ever, make a mistake in my diagnosis. The child is generally ill, feverish, with bad appetite and furred tongue, and passes urine very frequently, which is sometimes thick and milky, and sometimes of a very high colour ; he is generally in pain about the lower part of his abdomen, but is not able to give you any definite account of his condition. In order to illustrate the many and various phases of this condition, I will shortly describe a few typical cases which have come under notice during the last few years, cases which illustrate some very serious conditions, and point to the great importance of every medical man insisting that the foreskin of every baby boy, whom he has under his charge, can be easily put back, all adhesions broken down, and the filth cleaned out.

Child, æt. 3 years, had been under treatment for over twelve months for double hernia, worms, consumption of the bowels, and various other complaints, and was gradually getting worse. Got rapidly well after having prepuce, which was contracted, forced back, very extensive adhesions broken down, and about a teaspoonful of sebaceous matter, which had eaten into the glans, removed.

Child, æt. 2½ years, treated for over three months for typhoid or low fever ; cured immediately, on being cleaned out.

Child, æt. 18 months, in same family in which three cases of virulent typhoid were raging; suddenly developed bad symptoms, almost identical with the others, when, in spite of the opinion of the parent that the child had typhoid, I, led by the urinary expression, insisted upon examining the penis, and found very extensive adhesions, and quite two teaspoonsful of secretion. Immediate recovery.

Boy, æt. 8 years, passing almost pure blood per urethram for three days, which entirely subsided, with all feverish symptoms, on having adhesions broken down, and foreskin cleaned out. Typical expression.

Boy, æt. 7 years, failing in health and losing use of both legs from hips down, got quite well after having extensive adhesions broken down. Strong facial expression.

Boy, æt. 20 months, had been under treatment for inflammation of brain, bowels and lungs. Got rapidly well on being cleaned out. Condition partly found out by habit of pulling prepuce.

RE-SECTION OF THE INTESTINE BY A NEW METHOD.

By H. Widenham Maunsell, M.D., Dunedin, N.Z.

Surgeon to the Dunedin Hospital.

With antiseptic precautions, make an incision in the median line sufficiently long to enable you to thoroughly search the bowels for the wounded or diseased portion of the gut. Having found the part to be excised, bring it outside the abdomen with about six inches of healthy gut on either side, pack well round with warm large flat aseptic sponges. Clamp the gut in two places—from four to six inches above and below the portion to be excised.

New Clamp for Bowel.—Place a small flat sponge across the intestine, about four or six inches from the part to be excised. Transfix the sponge and the mesentery close to the gut with a strong safety-pin; pass the pin again through the sponge on the other side of the gut, and clamp the pin. Better still, have *two clamps* prepared, ready for immediate use, with the sponges sewn firmly to the arched portion of the safety-pins; the sponge should be sufficiently large to compress the intestine against the pin, so as to effectually prevent extravasation of the contents.

The advantages are—its extreme simplicity, its easy applicability, its innocuousness, and its efficiency, as the pressure can be regulated by the size of the sponge.

Neuber recommends a narrow elastic band to be passed through a small opening made in the mesentery, close to the intestine, at a suitable distance from each end of the piece of intestine to be removed, and tied around the gut to prevent the passage of fæces and flatus. I have tried this method, and found that the bowel was injured by the ligature, no matter what care was taken in applying it.

Sir William MacCormac, who wrote a very able paper on "Intra-peritoneal Injury" for the *Lancet*, May 7, 1887, says he has abandoned all artificial clamps, and relies alone on the pressure of the fingers and thumbs of his assistants. I believe an artificial clamp to be necessary, as an assistant's hands are always in the way, and must relax long before the completion of a long operation.

When the entire circumference of the intestine is involved in the wound, the bowel must be invaginated, so as to bring the peritoneal surfaces into perfect contact all round, and suture them in that position.

How is this to be accomplished? When Nature performs enterectomy successfully, she invaginates the upper portion of the intestine into the lower, and when the peritoneal surfaces have united by adhesive inflammation, the invaginated bowel sloughs off with impunity. Let us copy nature as closely as possible.

I will now, by a series of diagrams, endeavour to demonstrate the different steps of my operation.

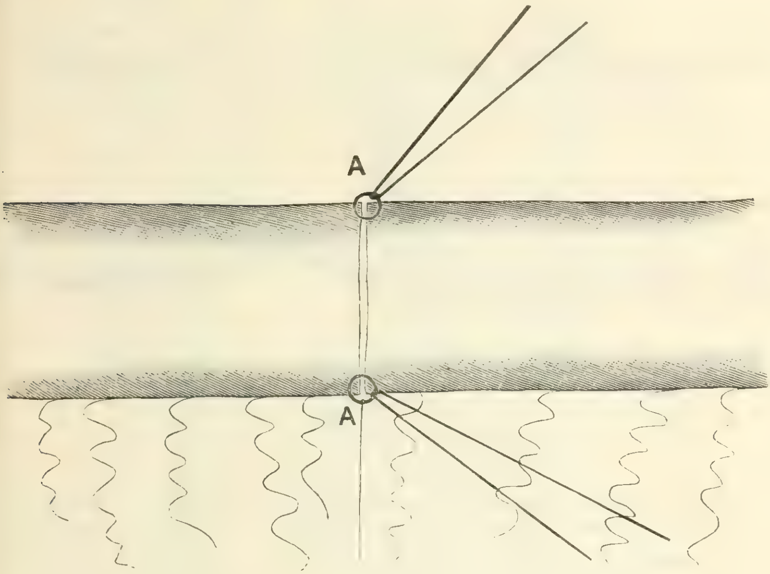


FIG. 1.

Cut surfaces of both ends of bowel brought together by two temporary sutures with long ends left intact, A A. One at the mesenteric attachment of the gut, and the other (exactly opposite) at the most distant portion of the bowel from the mesentery.

These temporary ligatures are very important, as they secure the *proper relative position of the two cut ends of the gut*, and facilitate their subsequent invagination through the opening made in the lower segment of the gut (see Fig. 5). If you examine the gut in a living animal, you will find the blood-vessels pass into it from the mesenteric attachment. These divide and subdivide, until they are lost in an invisible anastomosis in that portion of the intestine most distant from the mesentery. I propose to make an opening here in the lower segment of the gut, through which the invaginated ends of the divided bowel may be dragged by the temporary sutures, and when they are accurately sewn together all round, they can be pulled back into their normal position. The longitudinal slit in the lower bowel, which begins about an inch from its transverse section, is brought together by a *continuous suture.* By this simple device, the perfect union by suture of a complete transverse section of the bowel, with its peritoneal surfaces in exact position, and all the knots of the sutures on the inside, can be accomplished.

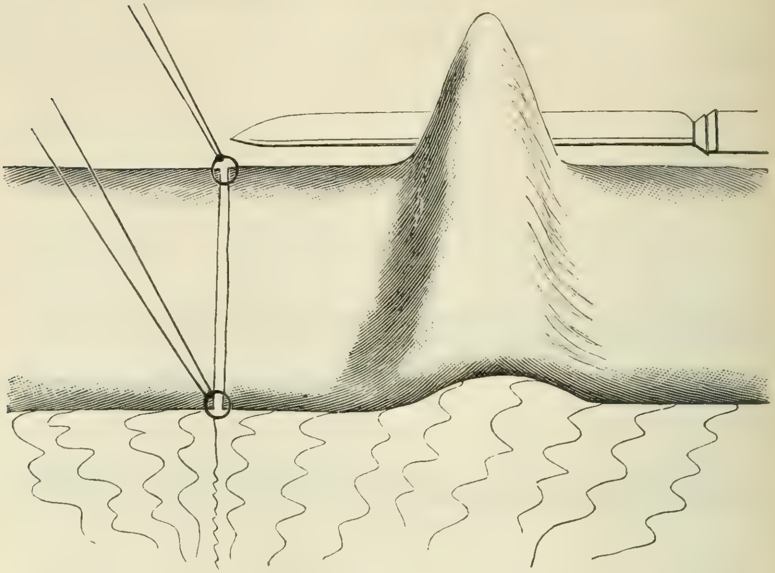


FIG. 2.
Longitudinal section (about an inch and a half long) with tenotomy knife, of that portion of lower segment of gut which is opposite to its mesenteric attachment.

This opening should be made about an inch from the severed end of the lower bowel; its length depends on the size of the gut to be invaginated. In performing this part of the operation, pinch up the coats of the intestine between the finger and thumb, and transfix with a tenotomy knife.

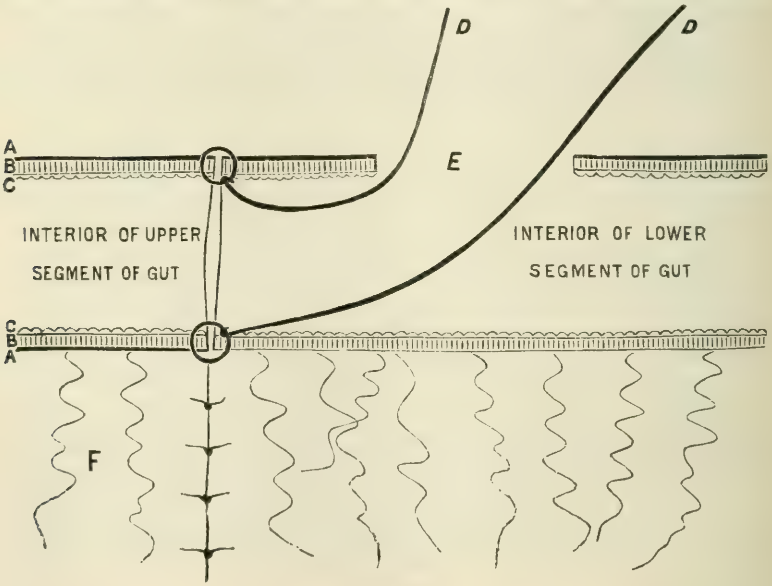


FIG. 3.
Longitudinal section of gut, showing A A, peritoneal coat; B B, muscular coat; C C, mucous coat; D D, temporary sutures passed into bowel, and out through the longitudinal slit made in lower gut; F, mesentery.

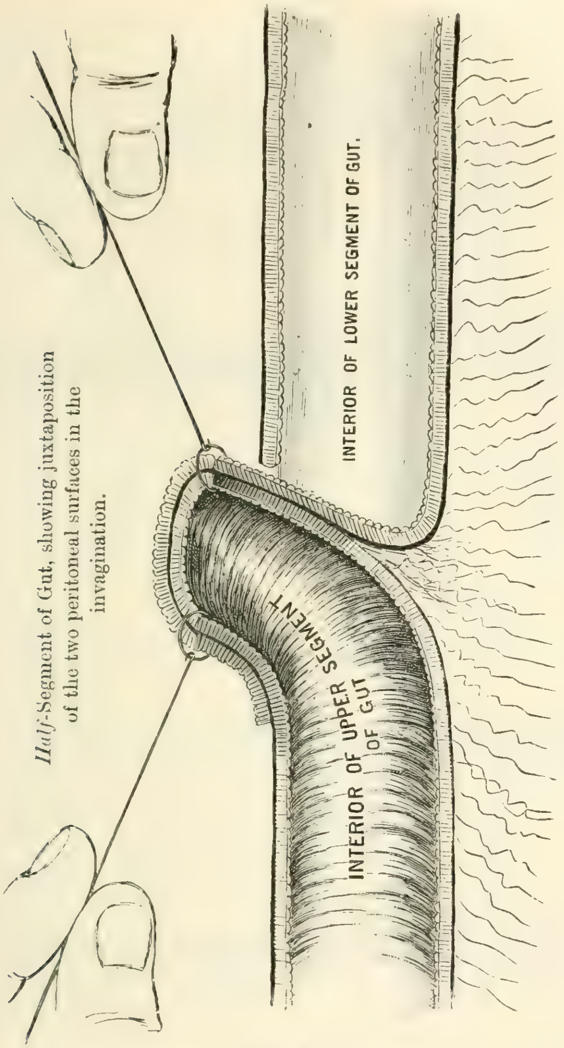


FIG. 4.

Longitudinal section of intestine, showing the relative position of the different layers of bowel, invaginated through the longitudinal slit.

From this diagram, it may be seen that the peritoneal surfaces are in accurate juxtaposition all round. While an assistant holds the ends of the temporary sutures, the surgeon passes a straight needle armed with stout horsehair through both sides of the bowel ; the horsehair is then hooked up from the centre of the invaginated gut, divided and tied on both sides. In this way, twenty sutures can be placed rapidly in position with ten passages of the needle. The temporary sutures are now cut off short, the bowel pulled back. The longitudinal slit in the lower bowel is closed with a continuous suture, and the mesentery brought together with four or five interrupted sutures.

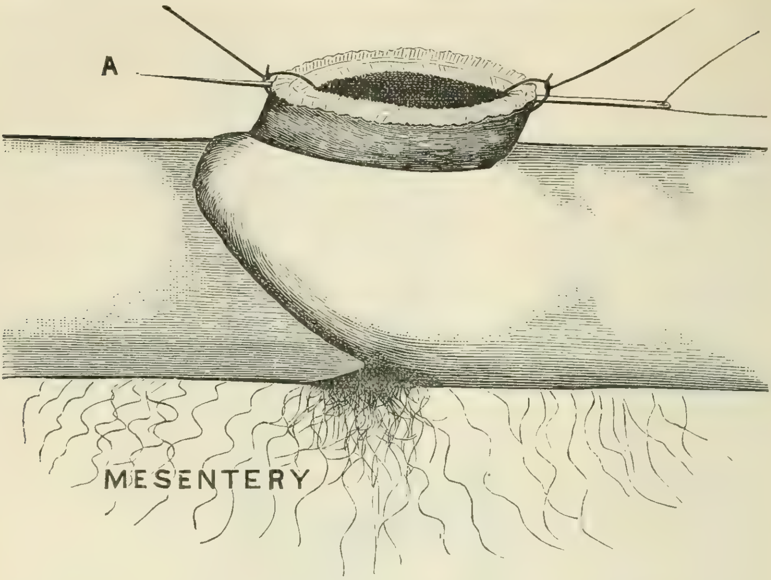


Fig. 5.

Invaginated gut, showing the two peritoneal surfaces in juxtaposition all round. A—Needle passed through both sides of the bowel, *introducing two sutures a a time.*

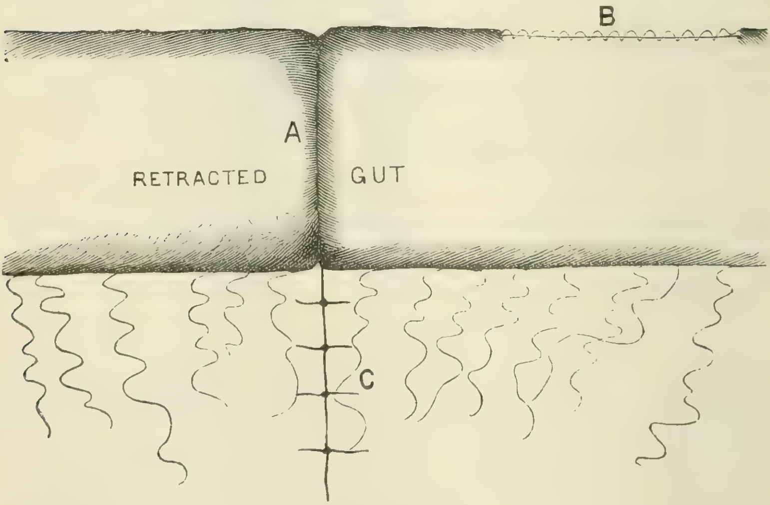


Fig. 6.

Diagram of Retracted Gut.

A—Line marking junction of both ends of bowel, the peritoneum well turned in, and the sutures and knots all inside the gut, making an almost invisible air and water-tight joint.

B—Longitudinal slit in bowel, sewn up with continuous suture.

C—Mesentery united by interrupted sutures.

This operation is applicable *to any part of the large or small intestine, and the pyloric end of the stomach* may be excised in the usual manner and invaginated through an opening in the centre of the anterior wall of the stomach, sewn up from the inside, and then retracted to its normal position.

SUTURES FOR BOWEL.

Fine silk is recommended in all the text books for sewing up the gut. I find horsehair or fine silk-worm gut far the best. Silk sutures, when wet, are very sloppy to work with. They swell up and cause suppuration in their track. None of these disadvantages apply to horsehair or silk-worm gut.

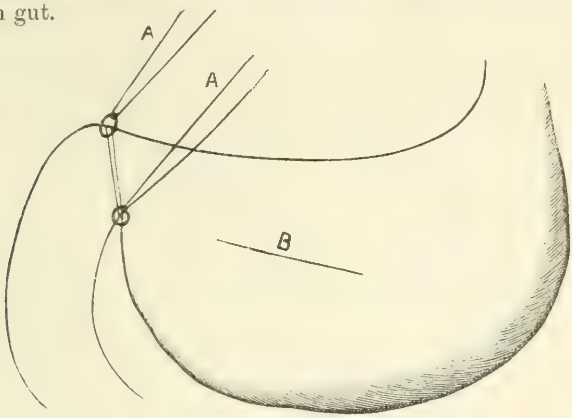


FIG. 7.

AA—Temporary sutures, with ends intact, uniting cut surfaces of stomach and pylorus.

B—Longitudinal slit in stomach, made by pinching up its coats between the finger and thumb, and transfixing with a tenotomy knife. Through this opening the invaginated cut ends of the pylorus and stomach are passed, when they can be sewn up from the inside, and then retracted to their normal position. The longitudinal slit sewn up with continuous suture.

A transverse section of the intestine should never be sewn up with a continuous suture, for the following reasons:—(1) The diameter of the intestine is always varying. (2) As the stitches would not all cut out simultaneously, they would form loops inside the intestine, which would be liable to catch, or be dragged or torn out by the onward movement of the contents of the bowel.

CRITICAL REVIEW OF THE RESULTS OF EXCISION OF HARD CHANCRE.

By M. CRIVELLI, M.D.

Is syphilis a general disease from its beginning? Does it commence at the instant the virus is absorbed? Is the first symptom, the chancre, the sign of an already general infection, or else is it a first local accident—a focus from which the virus is propagated to the remainder of the economy? Briefly, does infection precede or follow the chancre?

To resolve this question would be to resolve, at the same time, the question of the correctness of the abortive treatment of syphilis, to which it is intimately connected.

If infection has already spread on the appearance of the chancre, and if this symptom is merely its first manifestation, then all abortive treatments are wrong and useless, there being no advantage in destroying chancre. Evidently, the infection must be local for a time, however short that may be. On inoculation, the virus cannot be absorbed so quickly as to attack at once the whole economy. But how long a time? How are we to recognise the exact moment when, the virus beginning to diffuse from the inoculation point throughout the system, abortive treatment becomes useless? These are questions which we cannot answer, and which will only be decided on the day on which the key to the phenomena may be found—that is, when the pathological microbe of syphilis has been discovered.

Interesting works have already appeared, relating to this micro-organism, by Aufrecht, Klebs, Lostorfer, Martineau and Hamonic, Lustgarten, Hugo Marcus, &c., &c., but the results have not been sufficiently proved, and it is better to refrain from commenting on them, and to wait for new discoveries. In 1857, Ricord said in his lectures on "Chancre," "Syphilitic virus resemble all other species, whose effects we see without being able to follow the method of their invasion and irradiation in the organism. We see them acting, we recognise them by the lesions they cause, but there ends our knowledge."

What Ricord said in 1857, is unfortunately true to-day, as far at least as regards syphilis.

When syphilis first became known, means were sought to cure it, and the method which was immediately adopted was that which consists of destroying or extirpating the chancre on its first appearance, at a moment when it could be supposed that absorption could not have had time to take place. Thus we see cauterisation mentioned in the 16th century, in the oldest known works on syphilis (Jean de Vigo, 1508, and Blegny, 1696).

In 1877, the question seemed to be settled, nothing had been said about the abortive method for some time ; then a work by Auspitz and Unna, of Vienna (Vierteljahrsschrift für Dermatologie und Syphilis, 1877) was published during the year, and received great attention, practically calling the whole subject in question.

It is interesting to learn how Auspitz was led to re-consider the eradication of chancre, and to make fresh experiments by the abortive method. He, with Unna, was then making a series of researches on the pathological histology of syphilitic chancre, and on the alterations of texture which precede and accompany the initial sclerosis. They sought together to explain this more or less lengthy incubation of the primitive ulceration, which only begins to become indurated after a few weeks. Auspitz and Unna thought that the virus could enter into the organism from the local lesion by all vessels, and not only by the lymphatics. As for the swelling of the glands, it could not only be caused by the progression of the virus from the ulceration to the nearest glands, but also by a lymphatic, scrofulous, or tuberculous disposition.

Auspitz thought that, chancre being really a local lesion, the abortive method should be looked on as a blessing, and he commenced to excise chancres, having this time a therapeutic intent.

The observations of Auspitz, 33 in number, were minutely studied by Dr. Leloir, of Lille. The result of this analysis was, that ten of the patients presented undoubtedly symptoms of syphilis, notwithstanding

the excision of chancre. Nine of these observations must be rejected as being more than doubtful, the patients having left, or having been under treatment for too short a period; this leaves 14 cases on which Auspitz relies as proving his conclusions. Out of this 14, however, there are few which are absolutely convincing, as certain patients had previously had chancre (?) Others had only been attended to for some four months, Auspitz considering that a sufficient time; most authors, however, agree with Ricord, that a period of four months is not sufficiently long to judge if syphilis has completely disappeared. Moreover, these patients left to themselves, after being operated on, have been unwatched for some considerable time, and there is nothing to prove that they did not take mercury, thus retarding secondary accidents, or even causing a total disappearance of any.

The following table shows the results obtained by the authors in favor of, or contrary to, the abortive method:—

Names.	Cases.	Success.	Failures.
Sigmund	22	11	11
Hueter	7	2	—
Kuzlinski	1	1	—
Auspitz and Unna	33	14	10
Kölliker	8	3	5
Rydigier	3	3	—
Chadzynski	30	7	16
Weistlog	28	28	—
Jullien	6	1	4
Bumm and Rienecker	10	5	5
Ottmar Augerer	12	—	12
Lassar	38	5	32
Pick	136	19	117
Diday	13	—	13
Meyer	1	—	1
Ulrich	3	—	3
Langenbeck	2	1	1
Coulson	1	—	1
Thiry	1	—	1
Lewin	2	—	2
Caspary	3	—	3
Klink	5	—	5
Zeissl	5	—	5
Zarewich	1	—	1
Krowczinski	1	—	1
Gibier	2	—	2
Mauriac	8	—	8
Spillman	8	2	6
Tomashewski	50	—	50
Rasori	1	—	1
Keyes	2	—	2
Berkeley Hill	1	—	1
Quinquaud	3	—	3
Terrilloy	1	—	1
Mauriac	11	—	11
Hallopeau	1	—	1
	460	102	335

If to the above be added ten cases of excision, performed by the author of this paper, in Paris and Melbourne, and barren of results, we have the following totals :—Cases, 470 ; successes, 102 ; failures, 345.

If, however, account is taken of the large number of authors whom we have not quoted, owing to their not having given precise figures, who utterly condemn excision and cauterization, the number of the opponents to the abortive method would be greatly increased, while the results obtained by the partisans of this method should only be accepted with great caution. Even when successful, no one has a right to affirm that the operation is the certain cause of the abortion of syphilis. Cases in fact have been known, in which manifestly Hunterian chancres have not been followed by any secondary accidents. In my opinion, the question is settled ; and bearing in mind the uselessness and deceit of the abortive method, I have never excised chancres, except when situated at the end of the prepuce, which were consequently to be followed by ugly scars. There is not a single one of the pretended successes that can be admitted as having had an indisputable result. All are open to serious objections, and should they be submitted to a rigid scrutiny, little or nothing would be left in favor of the abortive treatment of syphilis.

To diagnose a Hunterian chancre is not always an easy matter. More than one of the most renowned syphilographers could be cited as having been obliged to recognise as insufficient the morphological character of certain chancres, and to prudently await secondary accidents before pronouncing on the case. Could not the partisans of immediate excision, or cauterization, have mistaken occasionally for Hunterian chancres that ulcerative folliculitis, so frequently observed on the penis, and which can be accompanied from various causes by a really inflammatory induration?

As for those authors previously mentioned, who pretend that they have excised infectant chancres, which they had diagnosed four days after their appearance, their observations are of no value, and are contrary to all the most authorised and classical opinions on the incubation of syphilis.

Amongst the cases which are accounted as successes by the partisans of the abortive method, some are found in which the patients have previously had chancres. It is a question as to whether these were Hunterian, and if the authors have not excised as initial sclerosis one of those ulcerations of the penis which cause so many errors of diagnosis, when one does not know about the antecedents of the patient.

Moreover, the time during which the patients were under observation after the operation, has been in most instances too brief. Ricord speaks of six months, Auspitz of four, but cases can be found where secondary accidents have appeared twelve months after the first appearance of the chancre. Even the conditions of this period of observation seem to lack the necessary strictness required for the affirmation of a scientific fact. Most of the patients were not retained in hospitals ; as soon as excision had been performed and healed, they returned to their homes, and only interviewed the doctor several months after. Syphilitic symptoms may have appeared, and disappeared, during this time. However attentive these patients may have been, the necessary knowledge to recognise and judge these symptoms could not have been theirs.

The following case will prove how fallacious are the results of the abortive method :—On the 2nd February, 1880, Dr. Ottmar Augerer, of Würzburg, excised a chancre eight weeks after infection ; there were no further traces of infection for months. The patient was married on the 7th October, 1880. All went well at the beginning, but on the 21st April, 1881, his wife miscarried at the sixth month of a fœtus in a state of putrefaction. The young woman was a member of a perfectly healthy family ; certainly, the disease did not come from her side. The husband was then treated with iodide of potassium and hydrargyric frictions. The wife became pregnant again, and miscarried a second time on the 16th April, 1882, at about the seventh month. There has never been any symptom of syphilis in the mother. Had the patient never married, this case of excision would have been quoted as a positive proof of the value of abortive treatment ; it proves, however, that a patient should not be considered as cured, although showing no signs of general infection.

Another class of authors exist who, though not upholding the certainty of abortive treatment, contend that if excision of the chancre does not avert syphilis, it causes, at least, the consecutive accidents to be of a more benign nature. It is no more claimed to destroy or avert syphilis ; but even this simple weakening of the virus is hardly admissible, and this very slight advantage does not seem to be a result of this method, which should be decisively condemned. For if the number of cases on which the partisans of the abortive method rely be counted, it will be seen that they are very limited.

The system is not only useless, but seems to be irrational. As a result of the excision of a chancre, there is always a more or less large and always very apparent scar ; while a Hunterian chancre, left to itself, hardly leaves any. The inconveniences that can take place from these large and indelible brands—"unexceptionable witnesses of a disease all would wish to hide"—ought to cause the abandonment of this method, which not only does not effect what its least sanguine upholders expect, *i.e.*, the attenuation of the virus, but is absolutely to be condemned as an operation.

As it is impossible, even to an experienced eye, to diagnose the differential nature of a chancre before the sixth day, and as the glands at this time are already generally tumefied, the partisans of excision, to be logical, should not only excise the chancre and inguinal glands, as performed by Bumm and Rienecker, and which is not sufficient, but also excise the glands of the iliac pit, an operation which is impracticable.

I think that I have established now that all experiments made up to date to avert syphilis have been unsuccessful. The great majority of negative results is conclusive, while out of the few successful cases, some should not be accepted without great reservations, and the others cannot stand a severe examination. It can thus be affirmed, that excision and cauterization are not abortive treatments of syphilis. All trials to grapple directly with chancre are useless, because as say Ricord, Rollet, Fournier, and the great majority of French syphilographers, to whose opinions everyone should submit :—"Syphilis is a general disease from the first, of which the first manifestation, chancre, shows itself after an incubation of about twenty days, when the general economy is already infected and saturated."

This affirmation is supported both by clinical observation and experimentation, which agree perfectly. The best proof that can be given of the worth of initial sclerosis, as demonstrating general infection, is inoculation. Everyone knows that the effect of inoculating a non-syphilitic person, from a Hunterian chancre, is to produce a chancre; that the same, inoculated on a person constitutionally syphilitic, has no effect; and that this same chancre, inoculated on the bearer of it, gives no results. These are facts which have been so often verified, that they are admitted by everybody.

In conclusion, it can be stated that the method of averting confirmed syphilis has not yet been discovered, and that the best abortive treatment of syphilis (if it can be so called), is still the administration of mercury at as early a stage of the disease as possible.

OBSERVATIONS ON THE PRACTICE OF CYSTOTOMY.

By Alex. MacCormick, M.D. et Ch. M. Edin., M.R.C.S.E.

Hon. Surgeon, Prince Alfred Hospital, Sydney.

I may state, at the outset, that I use the term cystotomy in its widest acceptation, that is, a section of the bladder for any purpose whatever. I purposely avoid the use of the time-honoured term lithotomy, as a misnomer, for we do not cut the stone, we cut the soft parts and remove the stone. I venture to plead for greater accuracy in our terminology.

Some justification for attempting a more accurate use of terms, is, I think, to be found in the fact that, with an increased variety of operative procedures in connection with the urinary organs, there has arisen a necessity both for general terms to express the broader, and particular terms to express the more particular features of such operations. Now cystotomy is manifestly a good general term, hitherto unwarrantably restricted in its interpretation; while lithotomy, though sacred by usage, is, as I have said, a misnomer, and does not express the special features of any operation.

I may venture to indicate how I think consistency and utility in nomenclature might well be attained.

I think the term cystotomy ought to be used as a general term as I have above defined it, while if a special term to signify cutting for stone be required, the term lithectomy would be preferable. Lithectomy could then be further specialised as cysto-lithectomy, and as nephro-lithectomy, according to the site of the calculus; or according to the site of the operation, as supra-pubic cysto-lithectomy, median perineal cysto-lithectomy, and lateral perineal cysto-lithectomy.

In taking as the subject for my paper the practice of cystotomy in its wider sense, I make no pretence of treating it exhaustively. Its scope is too wide to be adequately treated in any single paper such as this. At first, indeed, it was my intention to take up the subject of supra-pubic cystotomy alone, but, at the request of our Secretary, I have included some remarks upon the subject of cystotomy in general.

Few of its departments are better fitted to exhibit the advance of the science and art of surgery, than the surgery of the bladder. It is not here chiefly that the triumphs of antiseptic surgery are so marked, though, no doubt, it has contributed largely to the result; but, independently of antiseptics altogether, there has been a widening of the area, so to speak, of surgical interference, and an ever-increasing variety of procedure.

I shall avoid long tables of statistics, and will try, as much as possible, to base my preference for the adoption of any operative method upon anatomical and physiological grounds.

Varieties of the Operation.

Looking at a vertical mesial section of the body, it immediately becomes manifest that there are two safe routes into the bladder—one above the pubes and the other below, through the perinæum; or through the rectum in the male, or the vagina in the female. By safe, I mean gaining access to the interior of the organ without passing through the peritoneum. The rectal operation has been given up by surgeons of the present day, on account of the persistence of fistula afterwards in a great many cases, although plenty of room is gained by this method. Of vaginal cystotomy, I shall not here speak.

Practically, there are only three operations now practised on the male to obtain access to the interior of the bladder, (1) supra-pubic, (2) lateral perineal, (3) median perineal. I think these three operations, with a little modification according to circumstances, will meet all requirements. The median operation, as practised at the present day, is more an external urethrotomy than a cystotomy, as the bladder itself is not incised.

Choice of Operation.

It is an exceedingly difficult matter to lay down definite rules for the choice of an operation, in any case of bladder trouble where cystotomy has been decided upon. Many operators have a favourite method to which they will submit all patients, but this is not fair to the patient, nor is it fair to the method selected, for each operation has some special advantages, and special disadvantages, according to circumstances.

Supra-pubic Cystotomy.

The position of the wound in this operation is said to be a faulty one, from the point of view of general surgical principles, on account of the bad position for drainage, but this is the worst that can be said of it. To show that the track of the wound is limited by fasciæ, though not so effectually as in the low operation, I shall refer to the arrangement of the transversalis fascia in the front wall of the abdomen, to which Braunè, in his "Atlas of Topographical Anatomy," has drawn particular attention. He shows that the transversalis fascia, opposite the semilunar fold of Douglas, splits into two layers—an anterior and a posterior.—(See also *Liverpool Med. Chir. Journal*, Jan. 1885.)

The anterior layer passes down behind the rectus abdominis, and is attached to the upper border of the pubes towards its posterior aspect. The posterior layer when traced downwards is seen to be carried to the superior aspect of the bladder by the urachus, and becomes continuous

with the recto-vesical fasciæ and the capsule of the prostate. Of the correctness of the above description, I have satisfied myself by careful dissection. These two layers of fasciæ enclose a space which is called the porta vesicæ of Retzius, or the pre-vesical space, and it is into this space, and not into the sub-peritoneal space, that the bladder rises when distended. In the operation of supra-pubic cystotomy, it is this space that is entered; and here the bladder can be opened to a considerable extent in the middle line, without the operator running any risk of wounding the peritoneum, or even of opening the sub-peritoneal space, so long as the incision is confined to the middle line, and does not extend backwards beyond the urachus.

I may mention here an interesting fact, pointed out by Mr. Harrison, viz.:—"When there is a fracture of the pelvis, with extra-peritoneal rupture of the bladder by a fractured pubic ramus, it is evident that the urine will be discharged into the pre-vesical space; and, supposing the bladder to be drained by a perineal incision, this incision will be very unlikely to drain the space of its contained urine, which will remain mixed with blood, and in contact with the fractured bone."—("Surgical Disorders of the Urinary Organs," p. 28.)

Dr. Weir, of New York, reports a case illustrative of this, where he drained the bladder through the perineum, after making an incision above the pubes.—(*New York Medical Record*, March 29th, 1884.)

Mode of Performing the Operation on the Adult.

The hair having been shaven off the pubes, and the skin rendered aseptic, anæsthesia is pushed to complete relaxation. Then a red rubber catheter is introduced into the bladder, and the urine drawn off. The bladder is now to be gently distended with a solution of boro-glyceride (1 in 40). If fermentation is going on in the bladder, it ought to be gently washed out with boro-glyceride solution before finally injecting it. The quantity to be injected should be between nine and ten ounces for an adult, and from half an ounce to two or three ounces for a child, according to the age. In distending the viscus, I prefer Thompson's bladder syringe to any other, on account of the exact way in which you can gauge the amount of resistance. The catheter having been removed, the penis is tied with a small piece of elastic tubing. A rectal bag should then be greased, and introduced into the rectum just beyond the internal sphincter, and then distended with warm water (10 or 12 ozs.) An incision of sufficient length, according to circumstances, is made in the middle line in front, stopping at the symphysis pubis. The thin pale line, corresponding to the linea alba, is then looked for, and the incision deepened along this line between the edges of the recti with as little tearing as possible. The edges of the recti being gently held asunder by retractors, the anterior layer of the transversalis fasciæ is exposed, and should be pinched up with forceps near the lower end of the wound, and incised, and then the deposit of fat in the pre-vesical space will be exposed. Next, by means of the left index finger, with the pulp uppermost, the fat and the reflection of the peritoneum should be pushed upwards out of the way. A sharp hook or a loop of silk should be made to fix the bladder to the anterior wall of the abdomen in the upper part of the incision. Then an incision is made into the bladder large enough to admit the index finger with which to

examine the interior of the organ, and to judge of the requisite length of incision in the bladder wall that may be necessary. Here, I think, it is of the greatest importance to disturb the tissues in front of the bladder as little as possible. The soft tissues behind the pubes should not be interfered with; and, above all, the bladder should not, when it collapses, be pushed before the examining finger, and its fascial connections disturbed, because, if this be done, it is evident that the chances of extravasation will be much increased as the two layers of the transversalis fascia will be extensively separated. If the cystotomy is being done for stone, it can be placed in the most favourable position, and removed with a pair of forceps, taking great care not to injure the bladder wall, or to bruise or tear the edges of the bladder wound; it is always better to enlarge the wound with the knife than to tear it with the finger. The most suitable kind of forceps are a pair of "lithotomy forceps," with a lock like midwifery forceps, and the blades should be applied in the same way as in obstetric practice, taking great care not to include the wall of the bladder. The parts should be then well washed with boro-glyceride solution.

The question now arises as to whether the bladder wound should, or should not, be sutured. I think everyone will agree to suture the bladder, if the urine and viscus itself be fairly healthy. The best suture to use is fine catgut, and the best method of suturing is Gussenbauer's or Lembert's. The sutures should be placed close together. The superficial wound is then closed, and a drain put in the lower part of the wound, down to the bladder wall. It is very difficult to sew up an extra-peritoneal wound or rupture of the bladder, so as to render it watertight. In an intra-peritoneal wound or rupture, the smooth serous surfaces can be brought so accurately together as to render the wall of the bladder perfectly watertight; but in the former case, it is much safer to provide a good drain for any urine that may leak through. In any case, where the bladder wound is at all large, I think it is good practice to suture it carefully, and if the mucous membrane be unhealthy, or fermentation is going on in the urine, to leave room for a drainage tube at the lower end of the wound. A catheter in the urethra, unless in an exceptionally tolerant subject, is not advisable. In the case of adults with very unhealthy urine, I should be inclined to use a method described by Dr. Keyes, of New York, for draining the bladder through the perinæum—(*Journal of Cutaneous and Genito-Urinary Diseases*, July 1887, New York.) He uses a large red rubber catheter, and passes through its lumen a piece of twine, bringing it out at the eye, and then with a needle he passes the twine in through the eye again, and out through point of the catheter, until a knot, previously placed on it, catches. The part of the twine hanging from the tip is then threaded into the eye of a silver probe, which is turned up at the point; then, as in the operation for median cystotomy, the membranous part of the urethra is incised, making just enough room for the catheter to be drawn through. The probe is pushed through the incision along the knife into the groove of the staff, in the membranous part of the urethra, and then into the bladder, and is caught through the suprapubic incision, and by the aid of the string, the catheter is pulled into the bladder, the string is cut short and withdrawn, when the catheter can be fixed at the proper length inside the bladder.

I have performed this operation (supra-pubic cystotomy) four times within the last two years. The first case was that of a boy seven years of age, on whom I performed the lateral perineal operation on December 23, 1886. On making the usual incision, and passing the finger into the bladder, I found a stone, very rough, and as I consider, very large for a boy of his age. On passing the forceps, I had no difficulty in seizing the stone, but I judged, from the position of the handles, that the blades were separated to such an extent as to be likely to cause a great deal of tearing if extraction were attempted ; therefore, I considered it safer to withdraw the forceps. I had then to choose between crushing the stone or removing it above the pubes. I decided on the latter method. I got one of my colleagues to pass the index finger of the right hand into the bladder through the perineal incision, and with it to push the anterior wall of the viscus up behind the pubes against the lower part of the rectus muscle, so as to push the anterior wall of the bladder up into the pre-vesical space. I then made an incision as for supra-pubic cystotomy. I did not see the peritoneum at all, and I found the finger a most convenient and effective guide. On opening the bladder, I kept it forward with blunt hooks. The stone was removed, the forceps being much aided by the finger in the bladder. I sutured the bladder carefully with catgut, put a drain in the lower part of the abdominal wound, and left it in for forty-eight hours, the bladder being drained through the lateral incision. The abdominal wound healed by first intention, and the patient made an uninterrupted recovery.

In young or thin people where, for some reason, after the lateral or median perineal operation, it is deemed necessary to open the bladder above the pubes, the finger of an assistant acts as an admirable guide, and by judicious pressure on the anterior wall of the bladder, he can push it up into the pre-vesical space as readily and as effectively as if the bladder and rectum were distended.

My three remaining cases were those of children of one and one-sixth, two, and two and a half years respectively. In these three cases, the operative procedure was the same, and the supra-pubic method was chosen in the first case on account of the youth of the patient; in the second and third cases, on account of the size of the stone, which was first measured bi-manually with one finger in the rectum and the other on the front wall of the abdomen. The bladder in the first case was injected with about one ounce of fluid ; in the second and third, with two ounces. The bladder wall was not sutured. A drainage tube was used in the superficial part of the wound only, and the upper part of the abdominal wall was sutured. The drainage tube was always removed in forty-eight hours ; and in the first case, although urine trickled along the drainage track for the first two days, it did not prevent union by first intention in the greater part of the wound, which was completely healed in ten days. In the other two cases, the wound healed in twenty-one and eighteen days respectively. In neither of these cases did I use a rectal tampon, but instead, I got an assistant to push the bladder upwards and forwards gently with his right index finger in the rectum. In the case of children, I consider it is quite unnecessary to use rectal distension, as it is more likely to cause injury to the rectum, and it may even thrust the bladder to one side, and the rectum itself thus present in

the abdominal wound; and, furthermore, the finger can give the operator great assistance in the removal of the stone, by making pressure from below.—(Vide "Deutsche Zeitschrift für Chirurg.," Bd. 28th, 1 & 2 Hft.)

I have made reference to the use of the bi-manual, or recto-abdominal examination, under deep anæsthesia, in the diagnosis of stone, especially in children. This method of examination has not hitherto received sufficient recognition in the literature of the subject. I have been in the habit of practising it for several years, with the greatest advantage. Thus, I have been enabled to detect a calculus not bigger than a split pea in the bladder of a child of fourteen months, upon whom I was unable to pass the smallest sound. Another great advantage of this method is the information which it elicits as to the shape and dimensions of the stone.

Indications for Supra–Pubic Cystotomy.

(1) For stone in very young children.—I think the supra-pubic method is the best operation in very young children. I advocate it on two grounds, as being (*a*), the best operation anatomically; and (*b*), the safest.

(*a*) In regard to the anatomy of the bladder in the child, I think there is a field open for further investigation. The best description of it that I have found, is in Dr. Symington's "Atlas of the Anatomy of the Child."

Symington gives a vertical mesial section of a male child at birth, and the amount of urine in the bladder was estimated at one drachm. The orifice of the urethra, in this case, was at about the level of the upper border of the pubic symphysis. In front, the bladder extended forwards and upwards, in contact with the symphysis and the anterior abdominal wall, against which it lay, until within one centimetre of the umbilicus. The anterior surface of the bladder was entirely uncovered by peritoneum, and there was no tendency to the formation of a peritoneal pouch between the bladder and the anterior abdominal wall. Posteriorly, the peritoneum reached as low as the level of the urethral orifice.

In all the sections of a child at this age, the orifice of the urethra was at the level of the upper border of the pubic symphysis. Whether the bladder was empty, or distended, its anterior surface always lay in close contact with the anterior abdominal wall—this relation corresponding more than in the adult, with its tubular developmental character. The anterior surface was entirely uncovered by peritoneum, and was of a triangular shape, the base of the triangle being at the pubes, the apex towards the umbilicus, and the lateral boundaries corresponding to the hypogastric arteries. The bladder, in all cases, lay in contact with the lower two-thirds of that part of the anterior abdominal wall between the umbilicus and the symphysis pubis.

In a section of the body of an infant, three and a half months old, Symington found that the uncovered part of the bladder corresponded to about a quarter of the distance between the umbilicus and the pubes with the bladder empty. In an infant, seven months old, where the bladder contained one ounce of urine, the uncovered part of the bladder occupied nearly half the distance between the umbilicus and the symphysis.

In boys of from four to six years, he found that when the bladder was empty, its relations to the peritoneum differed in the contracted and relaxed conditions. When contracted and empty, the peritoneum came down behind the symphysis. When relaxed and empty, the membrane was reflected on the bladder above the symphysis. When distended with from two to three ounces, the distance between the reflection of the peritoneum and the symphysis was over two centimetres.

From a perusal of these facts, it will be seen, that in the child the peritoneum covers the bladder more extensively towards its base than in the adult, and therefore, the distance between the base of the prostate and the reflection of the peritoneum is relatively less. The facts, also, make clear the relation of the anterior surface of the bladder to the anterior wall of the abdomen and to the peritoneum. Another very important point displayed in the sections is the small capacity of the infantile bladder. In an infant, seven months old, the bladder was pretty fully distended when it contained only one ounce of urine.

In Holmes' "System of Surgery," Sir Henry Thompson says, that the most frequent cause of death in children, after lateral perineal cystotomy, is peritonitis, due presumably to injury to the peritoneum during extraction. Now, I hold that this would be much less likely to happen in the supra-pubic operation.

(*b*) If we look at the statistics given by Sir William MacCormac, and published in the *British Medical Journal* of March 19th, 1887, where he collected all the cases of supra-pubic cystotomy he could find in London and the provinces, from January 1885 up to that date, we find thirty-three cases of this operation in children under fifteen years of age, with no death; in Mr. Twynam's paper, in the October number of the *Australasian Medical Gazette*, last year, we find a list of twenty-eight cases of fifteen years and under, with one death. Assendelft has done the high, or supra-pubic operation, one hundred and two times, with two deaths.

If we compare these statistics with the statistics of the lateral operation, as given in Holmes' "System of Surgery," we find that, for children sixteen years and under, the death-rate is about one in sixteen. So that, judging from these statistics, the high operation is much the safer one in young children.

Still, I would not advocate its performance in all cases of children under fifteen, because, after five years of age, with a small stone, I do not know of any easier or more rational operation than the lateral. But if the stone be of such a size as to require a large incision into the parts at the base of the bladder, and any roughness in the handling, I think the supra-pubic route the safer. The size of the stone, at this period of life, can be very easily determined by the bi-manual examination, and then the operator should weigh in his mind the difficulties, and give the benefit of the doubt in favour of the supra-pubic.

Up to December 1886, I had not thought much about supra-pubic cystotomy in children, and I was always in the habit of doing the lateral operation; the results were always favourable, and beyond a little delay in getting into the bladder of a fat child of two years of age, I never had any difficulty or complication; but I am sure that one not practised in the lateral perineal operation, and who practises antiseptics carefully, can more easily and safely gain access to the bladder above the

pubes than below, in children of five years and under. I know of several unpublished cases, below this age, in which the perineal operation had to be abandoned, and a still greater number of cases in which considerable difficulty was experienced, and time spent, before the interior of the bladder was reached. Passing over the difficulties and complications that may occur during and immediately after either operation, we must not forget the after-effects of the two operations. In the high operation, the only bad after-effects that may occur in children are, a tendency to hernia and the possibility of a fistulous opening, both of which chances are very remote. But, after the perineal operation, there are the chances—(1) Of incontinence of urine (I have seen several cases of this, and I think it is always due to an overstretching of the sphincter vesicæ, from an insufficient incision). (2) Of impotence. (3) Of sterility. (4) Of fistula.

Conclusions.

(1) I would advocate the supra-pubic operation for stone in all children under five or six years of age; between six and sixteen, I should be less decided in my choice, but should, if the stone were of a considerable size, prefer the supra-pubic. I think, however, that it would be much better to perform litholapaxy for small stones in children, if one had suitable instruments, but I would limit this operation to very small stones.

(2) For large stones in adults.—No one will dispute the great advantage and safety of the high operation over any other method in cases of very large calculi in the adult; neither will any one dispute the advantages of the lateral perineal in any case of small stone where a cutting operation is decided upon. In this field of practice, litholapaxy has come to rival the lateral perineal so much so that, according to Sir Henry Thompson, all calculi that cannot be crushed ought to be too large to be safely removed by the perineal route, and therefore ought to be removed by the supra-pubic route. He even states that the high operation is, in his opinion, preferable to crushing for calculi, which, though not of the largest size, are extremely hard. Most surgeons have not the dexterity in crushing that Sir Henry Thompson has acquired, and although most men can crush a small stone with perfect safety, I have seen very disastrous results at the hands of very good operators in attempting to crush a large stone. According to Sir Henry Thompson's dictum, a stone is small, medium-sized, or large. A medium-sized stone is one which measures about one inch in each of two of its smallest diameters, anything below this is a small stone, and anything above is a large stone. Any calculus one inch or less in its two smallest diameters no one would hesitate to crush, but stones above this, except in the hands of very good manipulators, would be more safely removed by a cutting operation. The prostatic urethra itself can be dilated to nearly one inch, without much risk of injury, and the incision of the prostate would give three-quarters of an inch more room, so that a stone one and a quarter inches in each of two of its smallest diameters could be removed by the lateral perineal route without any tearing of parts, so that I still hold that in the hands of judicious operators the lateral operation ought to retain a place. Sometimes in cases of small stone, it may be desirable to perform cystotomy, as in patients of a phosphatic diathesis with

intense purulent cystitis, so as to allow the bladder rest by a thorough drainage for a few days. Such cases are better treated by a lateral perineal cystotomy.

(3) For tumour of the bladder. In cases of tumour of the bladder, supra-pubic cystotomy has achieved very wonderful results; but as there is generally a very considerable amount of doubt in these cases, as to the nature and attachments of the growth, a median perineal cystotomy in the first instance would clear up all doubt, provide a good drain, and in no way interfere with the subsequent supra-pubic cystotomy, if the case could not be dealt with through the perineal opening. Here, Thompson's sound will be of the greatest advantage as a guide to the high incision, and to push up the bladder wall.

(4) For enlarged prostate, with chronic cystitis. Supra-pubic cystotomy has been performed by Thompson and others in cases of enlarged prostate with chronic cystitis, where instrumentation had become very troublesome. By McGill, of Leeds, it has been performed with the object of removing portions of the enlarged prostate. He reports three cases in which the results were very satisfactory. When cystotomy is performed to provide for a permanent drain, I think most surgeons would prefer, when possible, to drain through the perineum, when, if necessary, portions of the prostate could be removed.

(5) For foreign body of an irregular shape, that cannot be broken up or extracted by a lithotrite.

(6) Cases of impassable stricture for catheterisation from within (*British Medical Journal*, No. 1, 1884).

(7) In cases of anchylosed hip joint.

(8) In deformed pelvis, from rickets.

(9) For some cases of encysted stone.

(10) In cases of pyo-nephrosis, where there is doubt as to which kidney is diseased, this operation might be performed as a preliminary, in order to decide which ureter was discharging pus or blood, before any more heroic procedure, in the way of nephrotomy or nephrectomy, should be decided on. In some such cases, of course, the endoscope might render exploratory cystotomy unnecessary, but in other cases, the amount of pus or blood might obscure the examination by that instrument.

Median Perineal Cystotomy.

This operation in the adult is the easiest and safest route to the interior of the male bladder, but it has the great disadvantage of giving only a small opening. I will describe the operation as I practise it. The patient, having been anaesthetised, and a median staff passed, is placed in the lithotomy position. The staff being held by an assistant, the surgeon passes the forefinger of the left hand into the rectum, and places its tip, with the pulp upwards, where the staff enters the apex of the prostate, so that he can feel the groove through the intervening tissues. Then, taking a long narrow bistoury in the right hand, he plunges the knife, with the back downwards, into the tissues of the perinæum, half an inch in front of the anus, through the raphé, and exactly in the middle line. With the finger in the rectum, he avoids wounding that viscus, and guides the knife into the groove of the staff at the apex of the prostate, and with a sawing motion, incises the floor

of the membranous urethra for fully half an inch close to the apex of the prostate. The knife is then withdrawn, and at the same time is made to cut upwards to give sufficient room, avoiding the bulb if possible, so as to lessen the amount of hæmorrhage. A Wheelhouse's gorget, passed into the groove of the staff, is guided by it into the bladder, and over this the left index finger of the operator can easily enter the bladder under ordinary circumstances. By making bi-manual examination, the whole of the inner wall of the bladder can be brought into contact with the examining finger.

Dolbeau, who made careful dilatations of the prostate and neck of the bladder experimentally with a dilator, has shown that the neck of the bladder cannot be distended to a diameter greater than twenty to twenty-four millimetres, without producing lesions of it, and of the prostate; so that no stone more than four-fifths of an inch in diameter can be removed by forceps without laceration.—("Ashhurst's International Cyclop. of Surgery," vol. VI., p. 258).

The great field for this operation, however, is not for the removal of calculi, but for the purpose of exploring and draining the bladder. Considered from an anatomical point of view, it is perfectly correct; it cuts no important structure, there is no hæmorrhage if the incision is not made to wound the bulb, and the drainage is perfect. This operation is very useful as a preliminary to any of the other operations in any doubtful case of bladder trouble. I have pointed out above its advantages as a preliminary to the supra-pubic. Mr. Harrison points out how more room can be gained, if necessary, by passing a curved probe-pointed bistoury into the bladder, along the pulp of the finger, and then cutting with it downwards and outwards to the prostatic capsule, and enlarging the wound in the same direction as the knife is withdrawn. I think it is everywhere admitted, that this is the easiest and safest way of entering a bladder for the purpose of exploring it. In obscure diseases of the bladder wall, it will become more common, not only for the purposes of diagnosis, but for the purpose of treatment. Through it the bladder can be thoroughly drained, and put at complete rest, as can also the urethra, so that the mucous membranes get time to recover; just as in the female, where dilatation of the urethra for the purpose of exploring, when no cause is found for the bladder trouble, often cures the disease completely by paralysing the sphincter and giving the viscus rest.

I have performed median cystotomy twice for chronic cystitis, which had persisted for years, and each time with great benefit to the patient. Besides for the purposes of exploring, removing tumours of the prostate and bladder, draining the bladder in cystitis, and of prostatectomy, Mr. Harrison practises this operation, in a somewhat modified form, for certain cases of irritable stricture, where instrumentation is apt to be followed by a great deal of febrile excitement, and where an internal urethrotomy alone would be dangerous. His intention is thus to stop all danger of sepsis, or urethral fever, by keeping the urine from contact with the diseased urethra. Let me quote a case, to show the advantages which followed complete removal of urine from contact with a raw or diseased urethral mucous membrane:—

C. P., aged 26, was admitted, suffering from an organic stricture of the bulbous portion of the urethra. The stricture was the result of

gonorrhœa, which he had contracted when he was about 16 years of age. It had been dilated to the size of a No. 7 on several occasions, but always recurred very rapidly. With some difficulty I succeeded in getting a whalebone bougie into his bladder, and this was followed by a severe rigor. To make the history short, suffice it to say that after a great deal of trouble, I succeeded in dilating gradually to the size of a No. 9, but after almost every operation he had a rigor, even after the gentlest handling. He was discharged from the hospital, with instructions to come regularly to have an instrument passed. This he partially neglected to do, and soon had to be admitted again for further treatment. He being so subject to rigors, I determined to perform internal urethrotomy, and in addition, to drain his bladder through the perinæum. His stricture being still large enough to admit a Thompson's urethrotome, I divided the constricted part completely along the floor of the urethra, passed a large median staff, entered the urethra at the apex of the prostate, as in median perineal cystotomy, next passed a probe into the bladder as a guide for a No. 12 gum elastic catheter, which I used as a drain, draining the urine by means of a tube into a vessel by the side of the bed. The patient escaped all constitutional disturbance after the operation. At intervals of three days I passed a large sound through the divided stricture, and washed out the urethra from the front with antiseptic solution. At the end of three weeks, the bladder drain was removed, and in a short time the urine flowed through the natural channel. The patient left the hospital with Nos. 12 and 14 soft catheters (English scale), which he was instructed to have passed at intervals of fourteen or twenty-one days. I saw him nine months after, when he described himself as being more comfortable than he had been for ten years. He has since married.

The advantages claimed for this operation are :—(1) Avoidance of grave constitutional disturbance ; (2) Avoidance of risk of extravasation ; (3) The stricture is more pliable after, and less liable to contract.

Lateral Perineal Cystotomy.

This classical operation has not been changed in any essential respect since the days of Cheselden. It is one of the best planned operations in surgery. Although its scope has been greatly limited by the practice of litholapaxy, and the supra-pubic operation, I hope there will still be a place left for it in the future.

An able, brilliant, and kind-hearted old surgeon of my student days was used to express his ideas about Heaven in the following words :— "Heaven is a place where all the good people are cutting the bad people for the stone."

As I have already said, I make no pretence of travelling over the whole field of the practice of cystotomy. The subject is an exceedingly important one, for I suppose few operations can claim to do more in the way of relieving human suffering, when judiciously carried out. I have only to thank you for the courteous attention which you have given to my observations on this subject.

SUPRA-PUBIC LITHOTOMY.

By J. Tremearne, M.R.C.S. Eng.

The safest and most effective method of operating for stone has been lately a subject of contention, for whilst a large number approve of lateral lithotomy only, there is an increasing number who favour the supra-pubic cystotomy.

The evidence already recorded from different parts of the world fully sustains the opinion, that when the bladder has to be cut into for the removal of large stones, of two or three ounces or more (which cannot be crushed), the opening should be made above the pubes. My limited experience inclines me to the belief that whenever cystotomy is necessary for encysted calculi, tumour, &c., the supra-pubic operation is preferable to the perineal. In judging these two great operations, the results as well as the dangers should be noted.

The death rate, so far as recorded, is lower in lateral lithotomy than in supra-pubic, but this is scarcely a fair guide, as the rule generally followed has been to perform the high operation on patients advanced in years, and suffering from large stones, the worst cases in fact, where probably diseased prostate or some other complication exists, which would necessarily entail fatal results if the lateral operation was attempted.

We may arrive, however, at some idea of the advantage of one operation over the other, in cases where the bladder has been cut into above the pubes, when it might have been through the perinæum, and *vice versâ.*

In August 1877, I cut into the bladder, above the pubes, after performing the lateral perineal operation for a boy of ten years old. A calculus filled the bladder and projected it forwards, so that it felt large and hard like a cricket ball at the lower part of the abdomen. Nothing could be done through the perineal opening, but with the addition of that above the pubes, it was easy to break up, and clear out the bladder thoroughly. After the operation, only a few drops of water escaped through the abdominal opening, but not any after the third day, and by the seventh, the abdominal wound was healed. Urine ceased to come through the perineal opening on the twenty-seventh day, and the wound healed shortly afterwards. The abdominal opening in this case would have been quite sufficient had it been a little larger, and that it was absolutely necessary for the removal of the calculus, was quite evident.

In the case of J. C., a sharebroker, aged 47 (reported in the *Australian Medical Journal*, for July 1883), all the usual symptoms of stone were present, and he was compelled to pass water every hour. He had been badly affected by spasmodic asthma for 18 months, and could not lie down, but slept sitting in a chair at night. After an unsuccessful attempt at crushing, the supra-pubic operation was performed, and a cystine calculus of $2\frac{3}{4}$ ounces in weight removed, as well as small bits of cystine gravel. A tube was put into the wound, and allowed to remain for a week, and the usual means of drainage adopted. Shortly after its removal, the opening quickly closed and healed. Five weeks after the operation, the patient had increased 30 lbs. in weight; and asthma, which previously distressed him, had nearly disappeared.

Robert F., aged 45, a big, burly, red-faced, and very nervous man, with hæmorrhagic diathesis, had the supra-pubic operation performed two years ago. A stricture affected the greater part of the urethral canal.

which was so sensitive, that on attempting to introduce a sound, violent rigors came on and prevented its being properly treated. The symptoms, however, became so urgent, that it was decided to operate, as stone of some kind had been felt in the bladder. Through the unusual amount of fat, and bleeding from the incision, many minutes elapsed before the anterior wall of the bladder was seen projecting forwards on the point of the catheter, when it was hooked up, cut into, and a calculus removed about one and a-half inches in length. Another stone, somewhat smaller, was found embedded in the upper and front part of the bladder. This might have been missed had the bladder been cut into from below. The incision into the bladder caused profuse hæmorrhage, although the plexus of veins in front was not wounded. During the night, two assistants, one on each side of the bed, held the wound compressed between the forefinger in the bladder, and the thumb on the outside of the abdominal wound, and thus almost entirely commanded the bleeding. A great amount of blood was, however, lost during the first twenty-four hours, but afterwards recovery was rapid, and within three weeks he was quite well. The stricture was dilated at the time of the operation, and gave no further trouble afterwards. Had the lateral operation been undertaken, I believe the bleeding from the bladder could not have been controlled so effectively as it was through the supra-pubic opening.

Edward C., aged 30, was operated on in July 1887. A stone (which was found afterwards to weigh exactly one ounce) could be detected readily, and might have been removed by crushing or cutting. He had previously made up his mind to have the high operation and no other, attempted. The opening above the pubes had closed, and he was up and well eight days afterwards.

Lateral perineal cystotomy has been performed only six times in the Creswick Hospital. Three of these were young boys ; one, 5 years old, died the same night ; another, aged 3 years, has now—seventeen years after the operation—involuntary micturition, and impotence ; while the third is the case mentioned, where the supra-pubic incision was combined with the lateral. One of the adults, W. B., aged 26 years, had the stone removed, but the perineal wound could never be healed, and he remained until his death, twelve months afterwards, with a fistulous opening.

John N., aged 36 years, had for six months frequent and severe attacks of bleeding from the bladder. Nothing definite could be detected (although he was several times under chloroform) except a slight roughness at the top of the bladder. Lateral cystotomy was performed in 1877, when a small stone was discovered to be deeply encysted in the wall of the bladder. It was not easily removed, as the fistulous opening leading to the stone was only one-eighth of an inch in diameter. Little bleeding took place at the time of the operation, but several sudden bursts occurred afterwards, and on three or four occasions death from syncope was apprehended. Had the supra-pubic operation been performed, the bladder could have been examined more thoroughly, and means used to check what nearly ended in fatal hæmorrhage.

John O'S., seen in September 1878, had all the symptoms of stone in an aggravated form. There was an opening in the perinæum, through which urine constantly dribbled. He stated that lateral lithotomy was performed on him two months before, and a stone over an inch long removed, but the wound had not healed, and his pain, relieved only for

a few days, had returned more violently than ever. A stone, $1\frac{1}{4}$ inch long by 1 inch across, could be readily made out in the bladder, and after several attempts with a powerful lithotrite, was removed by crushing, when the wound healed. It would have been impossible to miss this calculus had the bladder been opened from the front.

Thomas J., aged 19, was seen by me only once, about an hour before his death, when a distinct projection was noticed over the pubes. After his death, I made a post-mortem examination of the body. A stone lay in a pouch in front of, and nearly as large as, the bladder itself, causing an appearance of the bladder like an hour glass. The opening from the bladder into the pouch was only sufficient to admit a No. 2 catheter into the cavity, so that a sound passed through the urethra into the bladder detected nothing. The calculus could have been removed easily by the supra-pubic operation, but in no other manner.

Comparison of the Two Operations.

Supra-pubic.

(1) Cutting into the bladder from above the pubes may be attempted by a novice with but little fear, as long as he keeps in the centre line of the abdomen.

(2) There is no danger of wounding important parts, except the reflection of the peritoneum over the upper and front part of the bladder, but the peritoneum will rarely be seen if the rectum and bladder are distended (as Sir H. Thompson advises), and even if wounded, it seems of no great consequence as long as the accident is noticed, and immediately attended to. In boys, the anterior fold of the peritoneum is higher, on account of the abdominal position of the bladder, and no distension of the rectum is necessary. Of 478 cases collected by G. Dallas, and mentioned in the *Encyclopædia of Surgery*, in 13 the peritoneum was wounded, and with a fatal result in one only.

(3) The bladder is opened from the front, which is its safest aspect; some veins over the bladder bleed freely when divided, but they can be plainly seen and cutting them avoided.

(4) The opening can be made as large as necessary for any stone or tumour to be removed. The bladder can be examined more satisfactorily, and an encysted calculus or morbid growth (which might not have been detected through the perineal opening), removed. Hæmorrhage can be controlled without difficulty, as no arteries would be divided; the bladder can be readily washed out, and the wound treated antiseptically. There is no fear of fistula, incontinence of urine, wounds of rectum or prostate gland, impotence, or any other of the risks of the perineal incision. Although extravasation of urine is mentioned as one of the dangers, it has been rarely, if ever, reported as occurring, and by draining the wound both extravasation and septic poisoning are prevented. The bladder can be kept free from any accumulation of urine or pus, and the patient's body dry, by adopting the syphon principle. Some threads of candle wick, about two yards long, are doubled in the middle, and the fold pushed through the wound down into the bladder as far as it will go. The ends of the upper portion of the threads communicate with a bottle of fluid (solution of perchloride of mercury, 1 in 5000), raised above the level of the wound, whilst the lower portion passes across the patient's body, and ends in a vessel beneath the bed. The solution runs down along the threads and through the wound,

carrying off all purulent matter with urine, as soon as either appear in the bladder. The wick, except about an inch or two in the lower part of the wound, is covered with india-rubber tubing; and waterproof sheeting, with a small hole cut in the centre (to allow of the passage of the wick into and out of the bladder opening), can be placed over the abdomen.

Lateral.

(1) In cutting through the perinæum, considerable skill is required; the incision may not be low enough, or too low, or too much inwards, &c.

(2) The urethra may not be opened as far back as it should be. The artery of the bulb, the pudic artery or the rectum, may be wounded, or the prostate cut through. The prostate may be torn from the membranous portion of the urethra, a misfortune which sometimes happens when children are operated on, in the attempt to get the finger into the bladder.

(4) There is but a limited amount of room for grasping and removing a stone, or morbid growth, and for examining the bladder.

(5) The difficulty of controlling secondary hæmorrhage.

(6) The chances of incontinence of urine, wounds of rectum or prostate gland, impotence, &c.

TWENTY SUCCESSFUL CASES OF SUPRA-PUBIC CYSTOTOMY.

By Henry O'Hara, F.R.C.S.I.

Senior Surgeon, Alfred Hospital, Melbourne.

In February 1887, the House Surgeon at the Alfred Hospital published in the *Australian Medical Journal*, the notes of my first case of supra-pubic cystotomy. The operation was performed successfully for the removal of a large oxalate of lime calculus, and I claimed for the operation, that it was the first recorded in Australia. I was so struck with the wonderful results obtained by the lithotomists of the old world, in their revival of supra-pubic cystotomy, that I determined to perform that operation whenever a suitable case should present itself.

I had removed several large and small calculi by the lateral method, both in private and hospital practice, with varying success; and I always felt, that in performing perineal section, one was working at a great disadvantage (more particularly in cases of enlarged prostate gland), and how helpless one necessarily was in arresting the hæmorrhage that might occur in the region of the prostatic plexus.

The pressure that is usually applied, in the form of a "plug," not only prevents the flow of urine through the wound, but itself very soon becomes a source of septic mischief, and holds fœtid material for the prostatic veins to take up. Where chronic disease of the bladder is the result of the long continued irritation, caused by a stone within its walls, I hold that it is as necessary to give free exit to its contents, as is the drainage of a purulent cavity in any other region of the body. If, therefore, in the removal of a stone from the bladder, I find that no vesical trouble exist, I allow the wound to heal as speedily as possible; but on the other hand, where a collection of putrid urine has accumulated for a length of time—a semi-paralysed bladder having merely rid itself of overflow—I keep a portion of the wound in its walls open with a drainage tube, until I have satisfied myself that the mucous lining has

regained its normal condition. During the operation, the peritoneum in this region can be kept up with very gentle traction. The anterior wall of the bladder is its thickest and strongest part, and therefore, more likely to heal best.

In children, the anterior bladder wall is quite uncovered by peritoneum, although the bladder lies high up in the abdomen. Its posterior wall is, however, covered by peritoneum down to the level of the prostate gland. The blood-vessels, supplying the parts anterior to the bladder, are not of a formidable nature.

In my first operation, December 8, 1886, I took two steps, which at that time were laid down as imperative, viz., inflating the rectum, and suturing the divided walls of the bladder; and experience has since taught me that neither step is necessary—in fact, that both are sometimes harmful. I can quite realise how a partially diseased bladder would tear (when the knife was applied to it), from the intense pressure of a rectal bag. I cannot see any advantage in filling the bladder to bursting-point, and I never inject more than six ounces into it myself. It can be kept well away from the peritoneum, if the catheter or sound is properly held in position.

The sutures, I consider, only retard the healing process, causing sloughing of the parts, and I do not think there are any authenticated cases where no urine escaped through the wound, after the operation had been completed. I have quite discarded the use of sutures.

Having had the pubes shaved, and 6 ozs. of some antiseptic fluid injected into the bladder, I make an incision from two to three inches in length in the median line, commencing about one inch above the pubes. This incision is carried down to the bladder. I then introduce my finger into the wound, and guided by the sound inside, I feel for the anterior superior aspect of the bladder. Having seized the wall in this position, I make an opening through it about one inch, so as to admit my finger. If the stone be a large one, the incision can be lengthened to suit the operator. The stone is now grasped with a lithotomy forceps, and extracted, and the patient put to bed.

My reasons for making the incision so high up are, because it is less likely to be encroached upon by the urine, if that fluid be drawn off every two hours for a few days; and also, because the superior surface of the bladder is more likely to be healthy, being further away from the part where the stone has been lodged. And I find it a good plan to have the patient's bed raised at the head, so as to have him lying on an inclined plane.

Should a stricture of the urethra co-exist with stone, the operation of internal urethrotomy can be done at the same time as the lithotomy.

I did Teevan's operation in three cases, with good results, leaving a drainage tube in the bladder to drain off the urine while the urethral wound was healing.

In conclusion, I must express my delight at the results of supra-pubic cystotomy in chronic cystitis, where incrustations form on the bladder wall. It is not my intention to occupy your valuable time with the notes of every case. I have made out a tabulated list, giving the age of patient, the complication (if any) co-existing, the duration of time from date of operation until healed, and the result when healed. The shortest cure was 9 days, in a Chinaman at the Alfred Hospital, and the longest 236 days, the patient's bladder being in a very diseased condition.

Case.	Initials.	Age.	Complication.	Character of Stone.	Remarks.	Result.
1	M. C.	56	Cystitis; pus in urine.	Oxalate of lime, 625 grains.	Sutures put in bladder caused sloughing. He passed his water naturally in twelve days, and wound was healed in fifty-three days.	Cured.
2	S. D.	6	None.	Phosphate of lime, 300 grains.	This was a very large stone. No sutures used; healed in seventeen days.	Cured.
3	C. J.	16	None.	Phosphate of lime, 410 grains.	Healed in twenty-eight days.	Cured.
4	R. R.	64	Stricture.	Uric acid, 562 grains.	Teevan's operation, and then supra pubic. Healed in thirty-six days.	Cured.
5	A. C.	67	Chronic cystitis; bladder walls encrusted with phosphatic deposit.	None.	Supra pubic cystotomy, and bladder walls scraped with a Volkmann's spoon to remove deposit. Healed in thirty-eight days.	Cured.
6	G. D.	22	None.	Oxalate of lime, well-marked "Mulberry," 600 grains.	He got an attack of acute hepatitis four days after operation, was jaundiced, and vomited a good deal. Healed in forty-two days.	Cured.
7	J. B.	67	Stricture and false passage from attempts to pass catheter before coming into the hospital.	Uric acid, — grains. Not weighed, but was about size of bantam's egg.	Teevan's instrument used to divide stricture; then stone removed by supra-pubic method. He was in a very low state of health, and was not discharged from hospital for 236 days.	Cured.
8	G. M'D.	9	None.	Phosphate of lime, 312 grains.	He was treated for nocturnal incontinence, and had no other symptom. I passed sound, and found stone. Wound healed in twelve days.	Cured.
9	C. S.	58	Middle lobe of prostate bulging into bladder.	Only phosphatic encrustation.	Lobe enucleated, and bladder scraped. Healed in thirty-five days.	Cured.
10	Ah W.	27	None.	Oxalate of lime, 530 grains.	Healed in nine days. Passed his water per urethram four days after operation.	Cured.
11	J. A.	56	Severe hæmorrhage from bladder after railway accident, May 23rd, 1887.	Uric acid (encysted), — grains.	Never felt any symptoms of stone till after Windsor accident. On opening bladder, I found where the stone had been encysted. Healed in twenty-eight days.	Cured.
12	G. H.	21	None.	Phosphatic, — grains, not weighed, but $1\frac{1}{2}$ inches by 1 inch.	Healed in twenty-one days.	Cured.

Case.	Initials.	Age.	Complication.	Character of Stone.	Remarks.	Result.
13	C. D.	59	Stricture and cystitis.	Only a thin shell of phosphates over posterior wall. Grains not weighed.	The urine in this case literally stank. He passed it guttatim I did Teevan, and then supra pubic, scraped off deposit with my finger nail, and swabbed out bladder with cocaine and then argent. nit. grs. 30 to 1 oz. Wound healed in fifty-five days.	Cured.
14	P. O'C.	36	None.	Phosphatic, 322 grains.	Healed in twenty-three days.	Cured.
15	N. M.	30	Double inguinal hernia. Cystitis.	Uric acid, 555 grains.	Healed in twenty-eight days.	Cured.
16	G. P.	42	Stricture and cystitis	Phosphatic, 90 grains.	As the stricture was not a very bad one, I did supra pubic, and in a week commenced gradual dilatation. Healed in thirty-six days.	Cured.
17	J. L.	42	Cystitis.	No stone.	Supra-pubic cystotomy, after all the usual remedies had been tried. Scraped deposit from bladder, and wound healed in forty-four days.	Cured.
18	H. G.	37	None.	Uric acid, 295 grains.	Healed in eighteen days.	Cured.
19	A. M.	71	Chronic cystitis.	None.	Supra-pubic, and bladder washed out with argent. nit. grs. 30 to 1 oz. Healed in forty two days.	Cured.
20	E. P.	44	None.	Phosphatic, 423 grains.	Healed in twenty-six days.	Cured.

NOTES ON LATERAL SPINAL CURVATURE, WITH SPECIAL REFERENCE TO TREATMENT.

By G. AFFLECK SCOTT, M.B., C.M. Edin., Maryborough, Victoria.

This subject seems to me worthy of attention (1) Because the complaint is so common. (2) Because it is so often not noticed, so often not considered, and so often left to nature's own treatment, or nature's own neglect. And yet it causes a great deal of discomfort and ill health, a good deal of pain, and in severe cases, sometimes complete invalidism and occasionally death, and the effects will probably be still more marked on posterity. I have been surprised to see how much lateral curvature there is in our country districts, often very slight, certainly, and frequently discovered only when examining the chest for other reasons, but always sufficient to justify treatment, preventive and curative.

The object of treatment is to restore the vertebral column to its normal shape, and to prevent its re-assuming the abnormal. Removing the cause is, of course, the preliminary step; treatment being followed out as indicated. Drawing or writing in bad position, inequality in length of limbs, &c., will require to be remedied.

Preventive treatment, as regards the spine itself, we need not fully discuss here. The chief points seem to me to be :—

(1) Gymnastics for girls as well as boys.

(2) Free natural movement and exercise to be allowed to children.

(3) Give young girls no corsets, and older girls very light ones.

(4) For shop girls, and all young people who have to stand much, allow sitting down whenever possible. This is an important point, and seldom, if ever, attended to.

(5) Introduce a reform in the system of teaching writing. This is looking forward, perhaps, too much, but it is sometimes well to be radical. It is impossible to sit over a desk, as at present taught, with the paper straight before one and write in the orthodox slope, without great risk to spinal rectitude. It is suggested to abolish the slope altogether, and let us all be taught straight or back hand. But why should not the paper be placed at an angle of 45° towards the left side, that would still allow an orthodox slope, and the spines would be grateful, whatever the caligraphist might be. It would be a question whether the latter method would tend to give us Laputan inclination of the eyes. But either of the two reforms would be better than the present system of endeavouring to induce spinal curvature in the writing class.

The cause being removed, the next question is, whether to allow the vis medicatrix to complete the cure, or to take its place; the former course is, perhaps, usually followed, but considering the number of cases seen, and seen too in a pretty advanced stage, its adoption is reprehensible; besides which, the curvature is, of itself, a predisposing cause of further curvature.

Having premised then that something be done, we have a bewildering number of different modes of action recommended, ranging from absolute rest to extreme exercise; from making instruments do all the treatment, to discarding instrumental support altogether. In severe

cases we may, perhaps, simply follow out Noble Smith's instrumental treatment, when instrumental treatment is necessary; that we leave, as we are discussing cases of medium severity. Sayre's jacket deserves notice. As a curative agent it cannot act, but in cases of caries, where movement is to be prevented, it makes an admirable splint, and by giving rest, allows nature to cure the caries, but the *curve* remains *in statu quo.* It is recommended in very advanced cases, where there is no hope of improvement, and where prevention of further deformity only is aimed at. Such cases, also, I cannot dogmatise upon, but should think them excessively rare; besides which, the jacket prevents the use of what muscle there is left, and Smith's apparatus should answer at least as well even in the worst cases.

Heavy instruments of all kinds, of which several have been invented, have all the same drawback, besides putting too heavy a yoke upon the patient.

But instrumental treatment is only necessary in severe cases, which are comparatively rare. The slight and medium cases (by far the more numerous class), may be treated without spinal supports at all, and among all the different instructions, the matter is much simplified if we remember that the kernel of the treatment is to make the muscles which have allowed the deformity undo the deformity—and then prevent return of the deformity. Cases where the muscles are incapable of so doing, come under the head of severe cases, requiring instruments, but they are probably not so numerous as supposed.

The two requisites in muscular treatment are *rest* and *action*:—1. Action (*a*) of one set of muscles more than the others, to undo the deformity; and (*b*) general, to keep the body in tone. 2. Rest (*a*) of these same muscles, to prevent fatigue which would leave their last state worse than their first; (*b*) of the body generally, to prevent general fatigue. It seems very simple, and the beauty of it is, that it is as simple as it looks. No fixed rules could be laid down as regards either rest or action, the amount of which must be regulated according to each individual case—amount of curve, strength of muscles, strength of body generally, &c., but the principle is easily laid down.

1. As Regards Rest.

Its advocates have gone all lengths, even to lying down—if I mistake not—in bed, for long periods up to one or two years. The failure of this need excite no surprise. Two debateable points arise:—(*a*) Whether the amount of rest should be regulated by the patient's feelings—the system of resting when tired—or whether a fixed daily time should be set. As a rule, I should certainly say the latter. A patient is a highly unreliable mechanism, and nine out of ten would not rest till over-tired. The time fixed would, of course, vary; in moderately severe cases, probably two hours twice a day would answer well. (*b*) Whether the supine or prone position should be adopted. The supine presses too much on the spinal column, besides having the great disadvantage that each motion of the head, as also the act of rising up again, tends to roundness of the shoulders, which is an evil. The prone position avoids these evils, but only if supervised; otherwise, there is risk of roundness of shoulders, as I have seen occur. The great advantage of the prone position is, that every movement of the head is

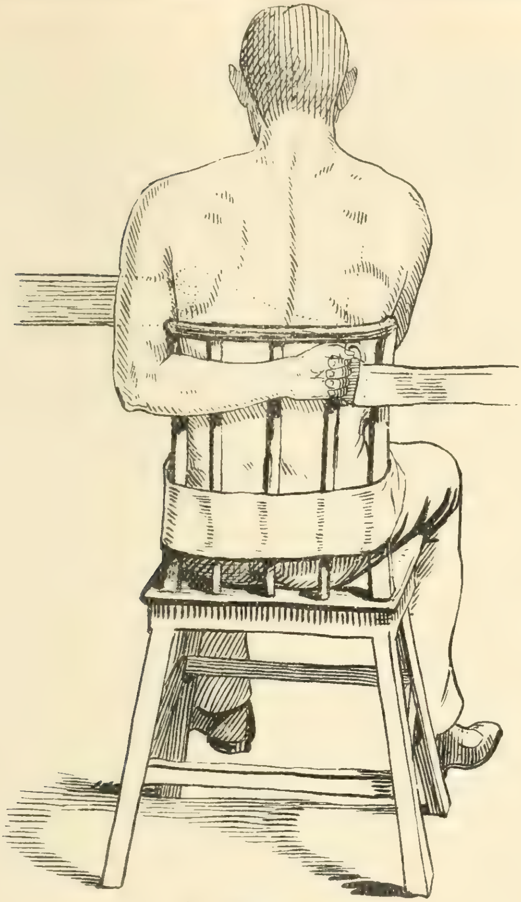
beneficial; but if the head droop, as it often does, the result is to do passively, what movements in the supine position do actively, *i.e.*, produce round shoulders. Verral's couch admits of this, and a well-padded or cushioned couch is perhaps preferable, with no special mechanism, where the cushions are arranged so that at rest, the head will not bow the back; and during movement, allow of beneficial action on the curve. Finally, the patient should have a chair, whose back fits the lumbar curve, to sit in at any time when fatigue is threatened, besides the fixed daily time of recumbency in the prone position. This, then, fulfils the requisites as regards rest; as regards other restrictions, in an ordinary case very few are necessary. Tennis is allowed by some surgeons, but I think the quick strokes in all attitudes and positions a risk, and should forbid it. Riding, probably, has little effect either way, and may be allowed; and ordinary work, except stooping at a table, writing, or even drawing, need not be forbidden if the evil position be not taken up.

All this is, however, only precautionary against over action, and in no way cures the curve. That is done by the second muscular requisite, viz., action.

2. Action.

Noble Smith's work, and the article in Heath's "Dictionary of Surgery," give good directions as to exercises which may be performed, and which it would be tedious to recapitulate. We might note, however, the evil of acting upon the dorsal muscles on the concave side of the curve, in the hope of thereby undoing the curve. Use them, and the result is as seen in Fig. 1. Certainly, the spines of the vertebræ come into the middle line, but the rotation will be increased, and the deformity of ribs and scapula made worse. The action required is exactly the converse—traction on the spinous processes of the vertebræ from the convex side of the curve, so as to undo the rotation. To effect this, I follow Noble Smith's plan, modified, I think, by Chiene:—Patient sits on a chair with pelvis fixed by band round chair, then with right arm crossed in front of breast and left arm behind back (in right dorsal curve, of course), with the hands holding hand-pieces fixed to elastic bands attached as seen in the Fig. 2, traction is made upon both elastic bands at once, beginning with two or three pulls once a day, and gradually increasing the number as required. Ordinary 4-inch elastic bands answer well. The mode of action is seen by reference to Fig. 2. The pelvis being fixed, each contraction of right arm acts upon muscles from sternum to arm and arm to spine on right side, and draws vertebral spine in a direction away from the middle line, but undoing the rotation; also, the left arm contractions tend to draw sternum in the direction of arrow, towards the left, thus also helping to undo the deformity caused by the rotation. The result bears out Smith's remarks on the subject.

But now, with diffidence, I touch a farther note on the treatment, not having had the advantage of extraneous help, which I should be relieved to get; as however much we admire heterodox theologians, a heterodox, and especially a youthful heterodox practitioner, is justly viewed very critically. My fathers will, I know, be lenient, and my brethren courteous.



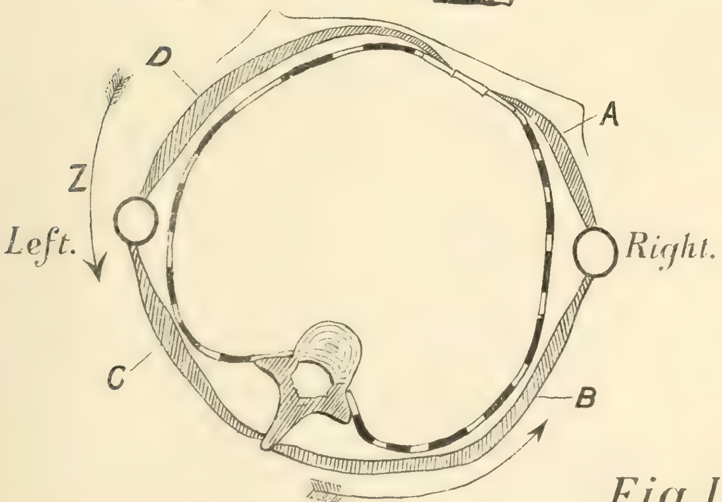


Fig. II.

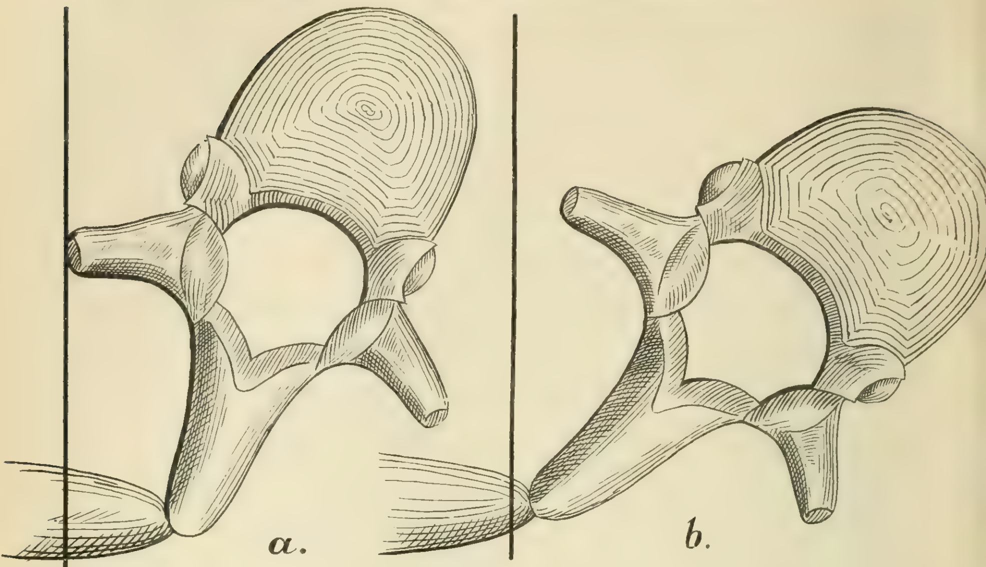
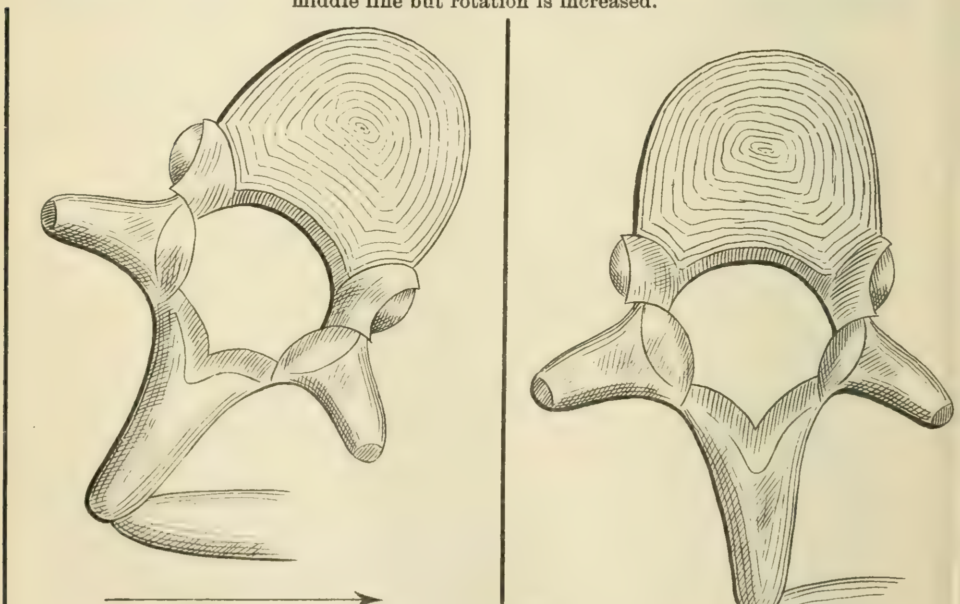


Fig. I.

To shew result on Vertebræ of acting on muscles on concave side of curve.

a. Lateral Curvature *per se*. *b.* Same after such action; Spinous Process approaches middle line but rotation is increased.



a. *Fig III.* *b.*

To shew result on Vertebræ of acting on muscles on convex side.

a. Curvature as before. *b.* After action, rotation undone, but Spinous Process not brought nearer middle line.

We are usually left at this point, but it seems to me that to stop here repeats precisely, though in a lesser degree, the error we have already condemned. When we concluded that something should be done beyond simply removing the cause of curvature, we considered the vis medicatrix insufficient of itself. We have now reached a point where we have, by treatment, undone the rotation—at least, to some extent—but the lateral curvature remains untouched, and we leave the vis medicatrix to correct it. This same vis seems to me to want help here, too, and it was this, as well as the incompleteness of the treatment already described, which caused me to enquire as to whether nothing more could be done.

The object of treatment is, as said, to undo rotation, and to undo lateral curvature. And I submit, that the vertebral column is not one individual, but it is a congregation of 25 separate individuals, who can all move separately, as well as together. We have seen the error of trying to cure curvature by dragging the spines to the middle line, and we have seen how the opposite is the rational treatment. But the effect of the rational treatment is seen in Fig. 3, the rotation is undone, but the vertebra remains as far from the middle line as ever ; and, as it is not our object to end with a spinal column, showing an example of lateral curvature without rotation, there must be some movement of the vertebra as a whole towards the middle line. Now, if we can effect this, as well as the undoing of the rotation, and especially if we can get the two processes to go on simultaneously, a great advantage will be gained.

If a patient be sitting up—or even lying down, though this to a lesser extent—any exercise, such as we have already discussed, acts at a disadvantage. If you press a number of discs one against the other, to move any one of them is difficult ; and if you wish to move a dorsal vertebra, to do so with the cervical and dorsal sitting upon it above, and the dorsal and lumbar giving counter pressure below, is not an easy matter, but if you can free the vertebra from its over-affectionate neighbours, and leave it a little elbow-room, it becomes easy.

The two advantages seem to me to be combined in the method of utilizing the old-fashioned extension process by hanging, plus the use of electricity.

The method of extension has unqualified condemnation from most surgeons, and, if it means the old fashion of making of the patient a pendulum, justly so; but there are extensions and extensions. The objections are—(1) That it puts too great a strain on the cervical portion of the spinal column. (2) That the ligaments, and perhaps muscles, get stretched by extension, become relaxed when the extension is taken off, and fall back into a worse position than before.

As regards the first objection, I submit that it depends entirely how much extension you exert. If the arms be supported also, and if the extension be only sufficient to have the patient's heels just off and the toes just on the ground, the good desired is obtained, and no risk to the cervical region incurred.

As regards the second objection, I beg leave to differ. The muscles do not get stretched, nor do the ligaments. The ligaments on the convex side of the curve are stretched without the extension which, in fact, relieves their tension. The ligaments on the concave side are not tense enough, and the straightening of the spine only makes them so ; and the

amount of extension sufficient for our purpose does not come within measurable distance of risk of stretching ligaments or muscles.

For extension, I do not use a tripod, but had a tetrapod made; the head pad fixed from a pulley in the centre, but the arm pads separate. I have arm-pit bands attached to pulleys on opposite legs of the apparatus, which allow of the arms being separately raised or depressed, as well as different direction of muscular contraction as desired.

Noble Smith says that extension needs to be very powerful to have any effect. "To illustrate this fact," he writes, page 10, Ed. 1888, "let us take a stout piece of copper wire, or a thin iron rod, and bend it to represent the spine. Then hold each end with the fingers or with pincers, and endeavour to straighten it by stretching it lengthways. The difficulty is great, we are working at a mechanical disadvantage, and probably will find it impossible to pull it into a straight line; but support each end, and press laterally with a finger against the curve, and with much less expenditure of force, the desired effect will be produced. This fact is of course not new, and no one would have thought of trying to straighten the wire in any other way than by lateral pressure, but the argument has not to my knowledge been hitherto applied in discussing the treatment of the spine."

But, while diffident about disputing authority so great, does not the argument seem fallacious? This copper wire or iron rod is one body, it cannot represent the spine, which is many members, and what may be predicated of the one, is not necessarily true of the other. Suppose we laid out a string of beads or a piece of elastic, curved to represent the spine, no one would dream of straightening that by lateral pressure, or in any other way than by extension. Not, of course, that a string of beads could represent the spine; it would be difficult to find a mechanical arrangement which would represent the muscles, ligaments, discs, articulations, bones, &c., which are factors in keeping the form of the spine, but the beads may throw a doubt on the validity of arguing that what an iron rod does, so also does the spine. Besides this, practically, I think we find that slight extension has a very decided effect. Place a patient erect but not extended, and apply the electrodes of an ordinary Faradic battery (mild current) over the rhomboids, and feel the motion of the spines; then extend slightly, and apply the electrodes again, the difference in response is most marked; so much for rotation. Repeat the same a few times, and the lateral curvature improves quite noticeably.

I therefore contend, that by combining extension with Faradism (or galvanism), you (1) give the required correction to the lateral curve, and (2) relieve the pressure of the vertebræ upon each other, and by application of the electrodes to any muscle or set of muscles required, much more easily undo the rotation of each and all of the offending vertebræ.

Friction, stimulating liniments, douches, massage, and gymnastics and other exercises, such as are detailed in the work spoken of, are useful adjuncts, besides general Faradisation of the dorsal muscles.

If the treatment be carried out carefully, and not entrusted to anyone else, I think it will be found that the risks spoken of have no real existence, and that the improvement in most cases will be more decided than by other methods. [Two cases, treated with success by Dr. Scott's method, are then related.]

THE MANAGEMENT OF TRAUMATIC HEAD CASES, WITH A VIEW TO THE PROPHYLAXIS OF IMMEDIATE AND REMOTE MORBID SEQUELÆ.

By A. J. W. Pettigrew, M.R.C.S.

As the necessity for, and the benefits of, any means of prevention used in the medical art, are least conspicuous when they are most successful, it is necessarily difficult or impossible to determine their exact value ; isolated cases can discover nothing, however closely observed.

The experience, however, of a considerable number of head injuries of various grades of severity, in the treatment of which the strict precautionary measures which are routine in my practice were adopted, induces me to believe that the mortality from these causes may be materially lessened ; while it is distinctly the case within the scope of my own observation that, under the employment of the system I indicate, the number of early and complete recoveries from these injuries has undergone a marked increase.

The sources from which the remarks I have the privilege of offering you are mainly drawn, are notes extending over some thirteen years, and recording fully any case of cranial injury of any interest that has been available to me for observation during that period.

I desire to be understood as affecting nothing more than to briefly set forth the results of a practical application of familiar and recognised principles of treatment, which, as I conceive, are too frequently entirely ignored. In dealing with the cases under consideration, I refer more particularly to those cases of little or no objective severity, and accompanied on the part of the patient, after recovering from the immediate effects of the injury, with but little sense of illness. The following may be cited as typical :—A young man, strong and healthy, has a fall or blow on the head, from which he suffers some slight degree of concussion —as, for instance, some mental confusion, giddiness, inability to stand or walk, lasting a few moments or minutes, or longer. After a few hours' rest, he resumes his work and continues at it, though without having recovered his usual sense of perfect health ; this lasts say for ten days (a very usual period of latency), when he is rather suddenly attacked with severe head symptoms, and obliged to desist. All the signs of active cerebral irritation rapidly supervene, and in this condition he presently dies ; post-mortem may be found a few small flat coagula adhering to the membranes, an ounce or two of red serum, but the brain substance perfectly sound in every part, no breach in the surface or ruptured blood-vessel discoverable to the most careful washing and examination ; or recovery may in time ensue, complete, or more frequently with more or less permanent or long persistent mental or bodily disablement, or with both. It is during this period of latency—the interval between the injury, and the accession of serious head symptoms—that an opportunity occurs of saving from ill consequences, perhaps, a fatal issue, a crippled nervous system, or a host of minor miseries. It may be suggested, perhaps plausibly enough, that the surgeon is seldom consulted at this time ; I think, however, that

experience shows it to be otherwise, and that he commonly sees the case early, summoned usually before the alarm and confusion of some accident has subsided. Should the patient be found to have sustained any degree of concussion (the extent to which consciousness is involved affording a means of gauging its severity) at this stage, however favourable appearances may be, the case, I apprehend, must be regarded as a serious one, and should be treated as such, the patient being at once removed to his home and to bed, and quiet and rest of mind and body insisted upon and maintained for a period of at least ten days, though if there be freedom from symptoms, he need not of necessity be kept in bed throughout this time. Should, however, there be any headache, mental confusion, shakiness, irritability, or other evidence of nervous derangement—the bowels, of course, having been attended to, while anything approaching purgation is to be avoided as depressing and a cause of disturbance and discomfort, and certainly not derivative—the patient should be put upon the bromide of potassium in doses, say of fifteen grains, frequently repeated. Should there be no improvement in headache, irritability, &c., five-grain doses of chloral hydrate may be added—a most efficient combination to this end. Should there be any rise of temperature, as there commonly is in these circumstances of a degree or so, drop doses of tincture of aconite may be given with this mixture ; diet, of course, to be in harmony with the treatment. The wetted cloth to be found on the head of every patient with cerebral symptoms is probably useless, while the circumcranial pressure afforded by a handkerchief tied with moderate tightness is often most comforting. Should, however, the case be one of greater severity, and the primary disturbance of a more formidable character, it may be conjectured that some intra-cranial structural damage has been sustained, and not uncommonly there may be reason to suspect that the upper part of the cord has been injuriously involved in the concussion—often a most perplexing complication from the unlooked-for and unaccountable nature of the functional perversions occasionally induced thereby. The reaction will now be longer delayed, and when it does come about, overstep the normal level and, without remission, merge, if uncombated, more or less gradually into a condition full of danger to the patient. The headache becomes increasingly severe ; delirium soon appears without any decrease in the headache—unlike, in this respect, the headache and delirium of systemic fever ; intense irritability, and restlessness, light and sound intolerable, scalp hot and having a feeling of tumidness, temperature perhaps 102° or 103°, pulse not frequent nor hard, but having a peculiar thrill, and giving the sense that it is morbidly inhibited, vision clouded —this often an early symptom. The ophthalmoscope will, in most cases, reveal a double optic neuritis, the disc appearing vascular throughout, the cup being entirely obliterated, and the sharp definition of the edge of disc lost, the nasal side usually being first affected ; and I can conceive that from these appearances much might be learned of the state of the parts inside the cranium, and beyond reach of our inspection. The case may now rapidly pass on to coma, signs of compression, and death ; the brain in these circumstances being very susceptible of the effects of pressure, though wonderfully tolerant of it when slowly developed. This state of affairs must be met early, before active congestion passes on to inflammation, by prompt and

effective measures. Position in bed is important; it should be such as offers least resistance to the performance of the circulation as a whole—that is, with the head and shoulders slightly raised, the back of the head to be much on the same level as scapular region. A free operation of the bowels should be secured as early as possible, the head shaved, cold applied by any of the many means in use; it is not necessary, nor perhaps desirable, that it should be intense in degree, but all-important that it should be maintained, and not intermittent. Moderate heat should be applied and maintained along the cervical spine, small doses of tincture of aconite and chloral hydrate being given at frequent intervals; and I think it will be found that cases not having an invincible tendency to go to the bad, or having some necessarily fatal element in them, will respond favourably to treatment conducted on these lines and carefully watched.

I may fitly conclude this paper by quoting the familiar aphorism usually attributed to Hippocrates, and endorsed by many great names in surgery—"No case of head injury is too slight to be despised, or too severe to be despaired of."

THE TREATMENT OF THE SAC IN HERNIOTOMY.

By K. R. Kirtikar, Surgeon H.M. Bombay Army.

The operation for the removal of the sac in incisions for strangulated hernia, is not a strictly new one. It used to be practised by surgeons of former generations. But with the recent advances surgery has made in dressings, and especially in the control of hæmorrhage, by the use of the hæmostatic forceps, the attempt to remove the sac of the hernia need not be considered one that would necessarily endanger the life of the patient, or increase the risk of the operation. Every surgeon who recommends the removal of the sac, in our own day, advocates the strict use of the antiseptic method of dressing. In my own humble opinion, the operation has no danger, if the dissection is carefully done. The extensive, freshly dissected surface, which the operation leaves behind, is rather an advantage, moreover, inasmuch as the parts, in healing, become firmly united by fresh poured lymph, which effectually destroys the smooth track of the former hernia, and ensures a "radical" cure. Some surgeons advocate the mere removal of a portion of the neck of the sac, or the removal of an inch of the serous membrane, an inch or half an inch below the neck of the sac, leaving the body of the sac intact. This, I opine, is not a safe proceeding, at any rate, in a country like India, where, we know, hydrocele is so common. Here, in leaving the body of the sac, we produce a sort of a sac—another tunica vaginalis, where, possibly, by some error in the absorptive and secreting process of the confined serous membrane, a hydrocele may be produced. I think, therefore, the removal of the sac *in toto*, an inch or half an inch from the neck of the sac downward, is the best course. The neck of the sac should be sutured by transfixion, as high as possible, to prevent pouching and a recurrence of a hernia. Half an inch or an inch would be allowable, as on healing and cicatrising, the parts retract, and would

thus leave no bagging. My experience is not much, but guided by the experience of others, I have performed the operation successfully, not only in uncomplicated hernia, but in cases with elephantiasis. It is too early yet to determine whether, in the men from whom I have removed the sac, there is a return of the hernia. I have briefly summarised the cases in which I have performed the operation. They are as follows :—

Case I.

G. K., a middle-aged man, Hindu, admitted into hospital on 13th July, 1886, with strangulated hernia (direct scrotal), right side. The hernia was of long standing, and this man had been wearing a truss for nearly five years. Occasionally the hernia came down—two days ago it did so, but could not be returned. Size as large as an ostrich egg, tense and painful; stercoraceous vomiting. Taxis has been tried outside hospital, but without avail. Ice has been put on for the last two hours. Pulse 100. No fever.

Operation.—The parts are shaved, and covered with a towel dipped in perchloride of mercury solution (1—1000), and carbolic lotion (1—100). The patient was placed under chloroform, and an incision was made in the long axis of the hernia, commencing a little above the position of the external ring. After going through the different layers of fasciæ and cellular tissue, the peritoneum was opened into. About four ounces of blood-tinged serum escaped. No attempt was made to reduce with the sac unopened. A finger was passed up to the seat of constriction, which lay at the upper part of the external ring, and a slight nick was made with the hernia knife passed over the index finger of the left hand, cutting upward and inward. This relieved the tension of the conjoined tendon, and the bowel, a large coil of the small intestine (ileum), was free. It was next pulled down gently, and examined at the seat of constriction, where there was the usual congested condition at the seat of strangulation. Here and there there was just a shade of peritonitis. The bowel was washed with equal parts of mercury perchloride and carbolic lotion, and returned into the abdominal cavity. The sac was next divided half an inch below the external ring, and the scrotal portion was carefully dissected. The proximal end of the sac was also dissected out all round for about a quarter of an inch, and a suture (double catgut) passed by transfixion through the centre of the cut ends, tying a knot on each side. The parts were washed with mercurial lotion, and iodoform freely applied to the cut and dissected parts. A draining tube was inserted into the parts under the skin, and the edges of the wound brought together by silver sutures. Iodoform applied to the sutured surface, and a pad of boric cotton and oakum was placed thereon, secured by a firm spiral bandage. Opium allowed, thirty drops of the tincture every four hours, and iced water to drink for twenty-four hours. Bits of ice to suck to allay thirst. No food.

On the following day.—No rise in temperature. No motion. Pulse 80. No pain. No tenderness of abdomen. Dressings not removed for a week. On the third day, the patient was allowed iced milk to drink. Tincture of opium twenty drops, thrice daily. No solid food was allowed during the first week. On the fifth day, the patient passed a few scybala. He was allowed an enema of castor oil and rice congee, which brought away a large mass of scybalous matter. On the 8th day, the

skin wound had healed by first intention, having been treated throughout antiseptically.

Case II.

G. M., a middle-aged Hindu, admitted into hospital on 10th Sept., 1886, suffering from strangulated hernia of left side, direct inguinal, of the size of a small cocoanut; it had been down more than forty-eight hours. Taxis had been tried without benefit. The man was allowed to remain with the ice bag on for three hours before he came to hospital, but there was no sign of the hernia being influenced by it. The parts were shaved, and covered over with a towel, steeped in perchloride of mercury and carbolic acid lotions.

Operation.—The man was placed under chloroform, and an incision made in the long axis of the tumour, right over the external ring. The sac was opened, and the index finger passed upward in the direction of the constriction, which lay at the upper and outer aspect of the conjoined tendon. A nick was made by means of the hernia knife—the knife being passed over the left index finger. The direction of the cut lay slightly upward and outward. There were no adhesions anywhere. The coil of intestine (jejunum) was now loose. It was pulled down gently and examined. It was very dark, but not "dead." There was a large quantity of dark red fluid, about six ounces, in the sac, and the peritoneum was injected. The parts were carefully washed with mercuric lotion, and returned into the abdomen. The sac was dissected out, and the cut ends of the sac secured, as in the case cited above, with the same mode of dressing and after-treatment. The man was sent out of hospital, cured, on the 6th October, 1886.

Case III.

N. K., an aged Hindu. male, over 70 years, not a very strong looking man, was admitted into hospital on 20th July, 1887. Patient has a strangulated hernia (scrotal direct) of the left side. The hernia has been down nearly twenty-four hours. Has the history of having suffered from strangulated hernia of the right side, for which he was successfully operated upon. Taxis has been tried, in the present instance. with no benefit. The hernial tumour is of the size of a cocoanut of ordinary size. Ice has been tried, but without avail. The man was therefore put under chloroform, and with the precautions mentioned in Case No. I., the operation was performed. The sac was opened, without making any attempt to reduce the bowel. The constriction, which was at the external ring, was relieved by making a few nicks over the tense fibres, with the pointed end of the scalpel, guarding the bowel with the index finger of the left hand—this procedure being not sufficient to reduce the bowel, the nicked spot was again invaded by the hernia knife, and a cut was made upward and inward. The cut was about a quarter of an inch, just enough to let the bowel slip in easily. Before the bowel was finally returned into the abdominal cavity, the constricted parts were examined—there was a dark rim, but the damage was reparable. On opening the sac, a good deal of red-tinged serous fluid escaped. There was a good deal of injection of the sac; in some parts slight opacity of the serous membrane. The sac was carefully dissected out. The incised parts and the protruded part of the bowel, which consisted

of two coils of the ileum, with the great omentum and mesentery drawn into the sac, were washed with the mercuric chloride lotion; the cut ends of sac, near the external ring, were secured by a double ligature of carbolised catgut, and iodoform was rubbed well into the dissected parts. A drainage tube was introduced, and the edges of the skin of the scrotum and abdomen brought together by silver wires. Boric cotton and oakum pads were put on, and secured by a spiral bandage. Iodoform dusted over the sutures. The patient was allowed nothing but iced water for the next twenty-four hours. Milk and ice allowed on the third day after the operation. Opium, thirty drops of the tincture, every four hours. On the third day, the patient passed a few scybala; he was therefore ordered a soap and warm water enema. The pulse was 80. No rise of temperature. No pain. No abdominal symptoms. The dressings were changed every three days, it having been found that the patient, an inveterate snuff-taker, constantly put his fingers, soiled in snuff, into the dressings and scratched the wound. (Query—Did the snuff act as an antiseptic dressing?) It evidently made no difference in the after progress and treatment of the case. The wound healed steadily without much suppuration. The skin, notwithstanding the old age of the man, and feeble vitality, healed chiefly by the first intention, and only a few drops came away by the drainage tube, which was removed in twelve days. He was discharged on 6th August, on the seventeenth day after admission into hospital, with the incision all but healed, there being just a point, where the lower end of the drainage tube rested on the skin, discharging a little pus.

Case IV.

J. B., a Parsee, male, aged nearly 60, in poor health; has suffered for the past twenty-five years from elephantiasis of the scrotum, complicated with double hernia. The size of the scrotum is twice that of an ordinary cocoanut. The tumour is riddled with sinuses, here and there discharging thin ichorous pus, smelling offensively. He came under my observation in the Thana Civil Hospital, in August 1885, for symptoms which seemed to simulate strangulated hernia of the right side. He had been accustomed to a truss which he wore right over the elephantoid mass, invading the right groin. In reducing his hernia, he had no difficulty usually. One morning he felt very sore about the seat of the hernia, where the pad of the truss, which was of brass—a heavy country-made article—pressed on the scrotal tumour. By afternoon there was distinct tenderness, and the man was uncomfortable. He had, consequently, not dared to meddle with the hernia; had not attempted to push it up; and, moreover, he left off wearing the truss. The following day the symptoms were very urgent. He had vomiting, which, coupled with a tender irreducible swelling in the vicinity of the external ring, with a history of former reducible hernia, excited the suspicion of the case being one of strangulated hernia. There was, however, no stercoraceous vomiting. There was a good deal of restlessness and constitutional disturbance, with a certain amount of fever (101°); pulse 110, very feeble. It was decided to put the man under chloroform and determine the nature of the complaint. I could in no way be sure that I had to deal with an uncomplicated case of strangulated hernia; yet the

possibility of there being a strangulation of the bowel struck me as the most feasible way of accounting for the local symptoms and the constitutional disturbance. The bowels had not moved for two days. I at once decided to cut down upon the swelling without any hesitation, to know the nature of the disturbance, and to remove any strangulation if there was any. The parts were washed with mercuric perchloride solution, after they were shaved, and an incision three inches long made right over the tumour, which now occupied a spot midway between the external ring and the lowermost part of the scrotum, taking advantage of a sinus in the scrotum. Cutting step by step, I came across the tunica vaginalis, and the testicle beneath. The tunica vaginalis was distended, inflamed, and full of purulent serous matter, with a tinge of blood here and there, with a coil of intestine (ileum) imbedded in it, and adherent to the tunica vaginalis. Thus my way was clear. There was a sort of a pseudo-strangulation of the bowel, which had got caught in the congenital hernial sac, now in a state of inflammation. There was no strangulation proper at the internal or external ring, nor at the neck of the sac; for there was really speaking no neck, as on passing the finger along the cord, it went freely into the abdominal cavity through a widely patent internal ring. I carefully separated the coil of intestine from the mass of the disintegrating products of inflammation, which seemed to me to have originated in, and extended from, the sinus; which, along with several others, had riddled the scrotal tumour in the close vicinity of the right testicle. The bowel was freed from its entanglement, and, although slightly injected, was returned into the abdominal cavity. I scraped a good portion of the tunica vaginalis, and where possible dissected portions of it; washed the parts with mercuric perchloride lotion, and rubbed in iodoform freely. A drainage tube was introduced after the healthy portion of the sac had been secured by a double ligature, thus trying to effect a radical cure for the hernia. The dressings used were oakum, over a large pad of boric cotton. The after-treatment of the case consisted of daily dressings. The man was kept on iced water, or bits of ice to suck, for the first twenty-four hours; milk, jellies, soup, and arrowroot congee allowed a fortnight after the operation. Opium was prescribed a grain every third hour for the first five days, and then every sixth hour for another five days. The bowels acted for the first time on the sixth day after the operation, hardened fæcal matter being passed. Enemata were given every other day for a week subsequently. The parts healed near the ring, and effectively plugged the inguinal canal; but the elephantoid mass remained as a sinus for about two months. Under iron tonics the man improved, but the sinuses caused a great deal of trouble. The patient was recommended an operation for the removal of the whole of the elephantoid scrotum, but he would not consent. The immediate effect of the operation was to put a stop to all constitutional symptoms—the fever went down, the pulse regained its normal quality, and the man had relief.

Case V

A male, middle-aged Maratha Hindu, convict in the Thana District Gaol, came under my obsevation in September 1888. He had an elephantoid scrotum as big as the largest sized cocoanut, complicated

with a hernia of the right side. There were sinuses in the scrotum. In this case, the elephantoid degeneration had attacked the prepuce and skin of the penis also, as far as the pubes. Having on one occasion shown symptoms of the sinus extending to the sac of the hernia, which was reducible, guided by my former experience, I at once explained the nature of the case to the patient, and asked him to consent to an operation for the removal of the elephantoid growth from the penis and scrotum, and for the radical cure of the hernia. He readily consented. He was put under chloroform, after the necessary preparations. The preputial affection was first removed by a careful dissection, afterwards the hernia was reduced, and the scrotum and penis were held tightly by an elastic tube, spirally fastened round the waist, to lessen hæmorrhage. Then with an oval sweep, the scrotum was dissected off the perineal surface ; the bleeding points were secured by the hæmostatic forceps. The testicles were next separated from the elephantoid scrotal mass, by a careful dissection begun over each spermatic cord, holding that in hand as a guide for the dissection of the testicle. The portions of the peritoneum forming the hernial sac on the right side were next dissected up to the external ring, after removing the elastic tube. I then left only half an inch of the sac beyond the external ring. I went on securing the bleeding vessels by catgut ligatures as they were cut ; the cut ends of the hernial sac were next secured by a transfixing double ligature. This hernial sac was partially inflamed in the close vicinity of the sinus, which was burrowing in the elephantoid tissue. The parts were well washed with mercuric perchloride lotion, and rubbed over with iodoform freely. The testicles were brought together and covered up with flaps of healthy skin secured from the scrotum before making a clean sweep of the affected mass. Silver wire sutures were used in the median line to secure the flaps, and a drainage tube introduced, extending from the root of the penis to the perinæum. The after-treatment consisted of opiates and iron tonics, good food, and dressings every third day. The first dressings were removed after a week, and consisted of boric cotton and oakum. The penis became gradually covered over with healthy granulation tissue, and within a fortnight there was firm union of the scrotal flaps, with very little pus or constitutional disturbance.

The last two cases have a special interest about them, inasmuch as they combat a complication of hernia, which simulates strangulated hernia ; and moreover, they show that it does not in any way endanger the life of a patient, or add to the risk of an operation for relieving true strangulation, or the pseudo-strangulation of secondary inflammations, resulting from the degeneration of unhealthy tissue in close proximity.

A CASE OF DIFFUSE SUPPURATIVE PERIOSTITIS OF THE TIBIA, TERMINATING IN RECOVERY ALMOST WITHOUT NECROSIS.

By Jos. C. Verco, M.D. Lond., F.R.C.S.

Honorary Physician, Adelaide Hospital. Honorary Medical Officer, Adelaide Children's Hospital.

C. G., æt. $8\frac{3}{12}$ years, male. He was taken ill on Sept. 11, 1888, with pain in the left ankle, and a "bilious attack." It was treated by the mother as a sprain; but the leg grew worse, and by the 17th, the swelling had extended to the knee. On that date, Dr. Poulton saw it; and on the day following, the child having been put under ether by Dr. Way, he incised the leg, and found the tibia bare in its whole length.

On the 24th, the case was transferred to my care (as Dr. Poulton had kindly taken my practice during an illness). There were then three incisions along the front of the left tibia—one just above the ankle, a second in the middle of the leg, and a third a little below the tibial tuberosity—varying from one to two inches in length, the higher ones being the larger, and gaping widely. A drainage tube passed from the upper wound by the inner side of the tibia, through an incision in the calf; while a fifth incision in the back of the leg, in the lower part, corresponded to the lowest one in front. After the blood-clot had been removed by poultices and suppuration, the tibia was plainly seen in all three anterior wounds quite white and bare, and insensitive to the probe, which could be passed along the bone from one wound to the other.

By Oct. 15th, the lower incision at the back of the leg had spontaneously closed, and the lower one on the anterior aspect. On Nov. 23rd, as the drainage tube was quite blocked, I removed it with some difficulty, and found it occluded by a piece of granulation tissue, almost cartilaginous in consistence, and containing minute bony spiculæ. At the time, it was supposed to be derived from the periosteum. I tried, with directors introduced into the two front incisions, to move the tibia; but it appeared firm, though quite bare, white, and insensitive.

Nov. 1st.—The incision over the front of the middle of the tibia had gradually closed up and epitheliated, and the bone in the upper wound was noticed to be of a pink colour, as though blood-stained; and when a director was pressed upon it, instead of being hard and dense, it was softened somewhat, and allowed the point to crush into it. There were no granulations on it.

Nov. 15th.—The previously bare bone was completely covered by granulations springing from its surface, large and firm. The appearance was different entirely from that presented by granulations gradually extending inwards from the margins of a wound, and covering over, but not adhering to, a dead bone. These evidently sprang up *in situ*; nor could the probe be made to touch bare bone anywhere.

Nov. 28th.—The granulations were large and irregular; no space could be detected between the margins of the wound and the bone.

The epithelium was spreading inwards, and covering the osseous granulations.

Dec. 4th.—The wound was almost completely healed over ; but two minute apertures remained, out of which, with a probe, I lifted a superficial piece of exfoliated bone, about three-quarters of an inch long and the sixteenth of an inch wide, and two small immeasurable scraps.

This is the only case, within my experience, in which, where there was at first evidence of separation of the periosteum from the whole diaphysis of a long bone, there was, eventually, complete recovery, practically without necrosis. And for this reason, I think it worthy the notice of this Congress.

In the last edition of Erichsen's "Surgery," page 280, we read, "as the name 'acute necrosis' implies, the disease almost invariably results in more or less extensive death of the compact tissue. The extent of the necrosis by no means necessarily corresponds to the area from which the periosteum has been raised by the pus, for after this has been evacuated, the membrane may adhere again, to a considerable extent, and the connection between its vessels and those of the bone be re-established. In a case lately in the University College Hospital, the tibia was felt to be bare from one end of the shaft to the other ; yet, after free incisions were made, no necrosis followed, except over an area of about one square inch near the lower end."

Again, from the *British Medical Journal*, for August 25th, 1888, we learn that Dr. McEwen, of the Royal Infirmary, Glasgow, at the annual meeting of the British Medical Association, cited and exhibited the case of a child who had had suppurative periostitis of the whole diaphysis of the tibia, the periosteum being completely stripped, except a portion posteriorly, where the nutrient artery entered. The bone was bare, and presented the appearance of white porcelain. Between the periosteum and the bone a series of layers of sublimated gauze were packed, thus separating the bone from its periosteum. This separation was kept up for four weeks, the parts being dressed every forty-eight hours, when they were observed. Two days after operation, the bone presented a pinkish blush, except a small portion three quarters of an inch in length, and half an inch broad ; this ultimately exfoliated. On the 16th day, the bone was covered with granulations, as also the periosteum. Four weeks after the operation, the bone was completely enveloped by firm cartilaginous granulations, those of the periosteum being soft and pulpy. The two layers were, for the first time, allowed to come together, and they soon coalesced. This case shows that bone is capable of living and growing, independently of its periosteum, if the nutrient vessels are still intact.

There are some points for reflection, which arise out of a case such as the one I record.

In the first place, what shall the disease be called ? Its common name is "Acute Necrosis." But this is evidently a misnomer. The bone may be bare, white, and insensitive ; but it is not, therefore, dead ; and consequently, to call it a necrosis, is to go beyond our facts. It may be dead—it may not be. Nor, as my case proves, have we reason for pronouncing the bone dead until at least six weeks have passed since first the collection of pus was opened. In McEwen's case, the bone was

seen to be pink within two days of operation; but in mine, not till six weeks had elapsed.

Some would call it "Osteo-myelitis," but of this, there is even less evidence; for the condition of the marrow is even more hypothetical than that of the bone itself. Besides, in my case the vitality of the bone almost certainly depended on the normal state of the marrow, which was able to maintain it in spite of the extensive or complete denudation of periosteum. What is certain is the existence of a periostitis, diffuse in its extent, and suppurative in its character; and diffuse suppurative periostitis is, to my mind, the correct name for the complaint. Some call it infective; but though I have had a case in which the infective element certainly existed, it did not in this; and consequently, the pyæmic character is an accident, and not an essential, just as it may be in a whitlow.

In the second place, this is not merely a matter of names. Names involve ideas. If we call the disease necrosis, we are apt to regard the bone as dead. If it be dead, it will not recover, and will require to be removed. Hence, as a prognosis, we are liable to assert emphatically and absolutely that the limb can never get well, and that a subsequent operation must be performed. And after this prophecy has been uttered for six weeks in an *ex cathedrâ* style, and has been fortified by the opinions of learned and experienced surgeons, we see granulations appear, and have to modify our gloomy forebodings; and nothing but the unexpectedly satisfactory termination of the case saves the reputation of the attendant and of the profession. Therefore, until the expiry of at least six weeks without improvement, we should not be hopeless of an apparent necrosis. May be, "it is not dead, but sleepeth."

There is one other consideration. If the bone is necrosed, it must be taken out of its periosteal covering. One rule is, not to operate for its removal until it can be felt to be free from its epiphyses. But does every surgeon wait until he can move the bone about in its casing? It is not every bold spirit that can display that masterly inactivity which sits down quietly by the side of a tibia for two months, and allows it to stare him in the face. Has a living tibia ever been removed in mistake for a dead one? Unless the bone is certainly free—not merely from its periosteal sheath, but from its epiphyses—however bare or white or insensitive it may be, it ought not to be extracted within a less period than two months from the time it has been exposed. And this rule we lay down for ourselves, not because recoveries of the apparently dead are so common, but because nature has demonstrated that they are possible.

ABSCESS IN THE LEFT MIDDLE CEREBRAL LOBE—EVACUATION BY OPERATION — TEMPORARY IMPROVEMENT—DEATH.

Reported by J. C. Verco, M.D. Lond., F.R.C.S. Eng.

Physician to the Adelaide Hospital, South Australia.

And E. C. Stirling, M.A., M.D. Cantab., F.R.C.S. Eng.

Surgeon to the Adelaide Hospital, South Australia.

The following case is considered worthy of the attention of the Congress, as it presents several points of interest in its diagnosis and treatment, and as it is the first case of the kind (so far as known to the reporters), which has occurred in Australia. Cerebral surgery is comparatively of so recent introduction, and is so beset with difficulty and uncertainty, both in the localisation of the diseases demanding its exercise, and in the diagnosis of their pathological nature, that every contribution which will serve to throw a light upon these questions, cannot fail to be both interesting and profitable. The case here detailed, while not so satisfactory to those recording it, as it would have been had the patient recovered, has the advantage of the post-mortem examination to confirm the localisation, and to indicate the succession of events in cerebral suppuration secondary to ear disease.

H. W., male, æt. 29, pointsman, was admitted to the Adelaide Hospital on November 11, 1888, under the care of Dr. Verco.

The following history was obtained from his wife :—About four weeks ago he began to complain of headache, chiefly in the left temporal region. On the 5th and 6th inst. the teeth on the left side began to ache, and on the 7th he came home from his work with great pain in the left temple, orbit and ear, and an aggravation of the toothache. He was "raving," and saying he would dash his brains out. He had had the left upper canine, and the left lower posterior molar extracted in the morning, without any relief. On the night of the 7th, however, he slept well, and in the morning was able to go to his work at 5 a.m. At ten o'clock he returned, seeming quite stupid, and in great pain with the teeth and head, and has remained in this condition since. His wife has not noticed any loss of power, nor does she know of any previous illnesses, except that five years ago he had some head trouble, which was relieved after a discharge of matter from the ear—which one, is not known.

On admission, the following notes of his state were taken by the House Physician :—He lies in bed with his hands to his head and groans as if in pain, and sometimes holds his head and shouts ; complains of pain in his teeth ; when asked his age, he stares in an astonished fashion, and says he doesn't know anything about it ; when told to put out his tongue he opens his mouth widely, but does not protrude it ; it is dry and fissured ; bowels confined ; no vomiting ; no tenderness of the scalp ; pupils equal, left optic disc seemed to be just a little swollen ; special senses unaltered so far as can be ascertained ; no aural discharge ; no paralysis of motion or sensation ; urine, no albumen

nor sugar; two stumps in the upper left jaw, belonging to the second and third molars, were removed.

Seen by Dr. Verco on the 16th :—Pulse 60, regular ; respirations 22, irregular in time and depth ; partial paralysis of the right side of the face ; left palpebral fissure smaller than the right ; after attempting and failing, he succeeded in protruding the tongue, which tended slightly to the right ; double optic neuritis existed ; there was a small amount of moist discharge in each ear, necessitating cleansing prior to examination. There was some difficulty in using the speculum, as he was rather noisy, and the ears were manifestly very tender. As far as could be determined, the membranes were absent in both ears. There was marked aphasia, the answers being quite irrelevant, and sometimes incoherent, though he evidently understood what was said. The right hand grasped thirty kilogrammes, and the left twenty-three. Sensation to touch was very distinctly impaired in the right upper and lower limb ; the hypæsthesia was questionable about the right side of the trunk. Plantar reflex was rather more marked on the left than on the right side.

Nov. 17th.—He passed a noisy night, but at 7.30 a.m. he began to quieten, and at 9 a.m. his condition was that of semi-coma. When seen by Dr. Verco at noon, he was quite comatose, without sensation of touch or motion, and not to be roused, with a freely perspiring skin and dilated pupils, stertorous breathing, very sluggish conjunctival reflex, and with very difficult deglutition. About half-past two, Dr. Symons examined the fundus oculi, and demonstrated the extent of the papillitis to be equal to five dioptrics, and noticed a small hæmorrhage in the left disc at the lower and outer edge. Veins full, and rather too tortuous. Divergent squint. He was transferred to Dr. Stirling for operation.

The diagnosis was an abscess in the tip of the temporo-sphenoidal lobe of the left side. The circumstances which led to it were the following :—

The extreme pain in the dental branches of the left fifth nerve, in the orbit, and about the ear, directed attention to its sensory root, with the Gasserian ganglion lying on the tip of the petrous bone, the aphasia to the left third frontal convolution, and the partial facial palsy to the Rolandic area immediately above. The partial affection of sensation on the right side of the body without paralysis indicated some affection, probably from pressure, of the gyrus hippocampi, and the parts adjacent on the under and inner surface of the temporo-sphenoidal lobe. An abscess, therefore, in the tip of this part of the brain, pressing downward upon the Gasserian ganglion, downwards and backwards upon the gyrus hippocampi, &c., and upwards against the third left frontal convolution and adjacent parts, would explain all the symptoms. The optic neuritis would be quite in order ; the history of four weeks' temporal headache would support the diagnosis ; and the account of head trouble years ago, relieved by aural discharge, would render it still more probable. Two circumstances were unfavourable. First, the difficulty of certainly determining the exact condition of the ears, about which, however, Dr. Giles coincided with Dr. Verco ; and next, the very rapid march of events. The speedy onset and considerable degree of aphasia, the progress of the optic neuritis, and the occurrence, within a few hours, of strabismus and deep coma—these pointed (if an abscess existed) to its rapid increase in size, or else to the extension of the

inflammatory mischief beyond the specific limits of the abscess into the brain tissue around.

Dr. Stirling supplies the following notes of the operation, and subsequent history of the patient:—

It having been decided on the morning of November 17 to operate on the afternoon of that day, the patient's head was at once shaved, well washed with soap and water and then with ether, after which it was kept enveloped in a towel steeped in a five per cent. solution of phenol.

The patient was semi-comatose, but complete narcosis was effected according to the plan recommended by Mr. Victor Horsley, by the subcutaneous injection of a quarter of a grain of morphia, after which complete insensibility was easily maintained throughout the operation by a very small quantity of chloroform.

It will be understood that the operation, and all subsequent dressings, were performed with strict antiseptic precautions, including the use of the spray.

The diagnosis being an abscess in the central part of the left temporo-sphenoidal lobe, it was decided to expose the surface of the brain at a spot corresponding to the junction of the posterior and middle thirds of the middle convolution of that lobe; and the spot fixed upon for the trephine hole was at a point an inch and a half above and about half an inch behind the external auditory meatus. This, with the skin incision, was marked out with a coloured pencil.

The scalp incision, made vertically to the bone, defined a nearly semi-circular flap, with a curve of about an inch and a half radius; the convex edge pointing upwards, and its highest point a little behind a line drawn vertically upwards from the meatus. In making this incision, care was taken not to divide any of the large vessels distributed to that part of the scalp, and as a matter of fact, there was no vessel divided which required ligature.

I desired to raise the whole of the soft parts with the flap, but I may here remark that, misjudging the thickness of the temporal muscle, I was not careful enough to do this quite cleanly in the first instance, and a thin plane of muscle was left adhering to the periosteum, and was reflected with that membrane by a crucial incision down to the bone. A disc of bone, which proved of very unequal thickness, was then removed from the region selected with a one inch trephine, and even during its elevation a little pus was seen to ooze through the track of the trephine at its lower part. On complete removal of the disc, this appeared to well up through a small aperture in the dura mater, just under the lower edge of the bony opening. I was afraid at the time that this aperture might have been due to accidental laceration of the membrane with the trephine, though I was using the utmost care to avoid such an occurrence. As will be seen subsequently, no such aperture existed, and this pus which first flowed was entirely external to the membranes. The dura mater bulged considerably, and was then incised for about four-fifths of the circumference of the trephine hole, at about a distance of one-sixth of an inch from its edge, the posterior branch of the middle meningeal vessels passing upwards and backwards through the unincised isthmus of dura mater, and being tied with fine tendon at the opposite margin.

On reflection of the flap of dura mater, the brain with its pia-matral covering also bulged conspicuously, and the convolutions seemed flattened, but there was no appearance of increased vascularity, or of any inflammatory affection.

A little pus was seen to exude from under the dura mater in the upper segment, but its source was not evident.

A very narrow tenotome was then passed vertically to the surface into the bulging brain, for about two inches, and a fine director made to follow in its track with all possible gentleness. About a drachm of normal pus immediately flowed along the groove.

As the brain still continued to bulge into the trephine hole in spite of this evacuation, it was thought that more pus must remain, and so the tenotome, and after it, the director, was gently passed in various directions through the same external surface opening. From several directions, but chiefly from a region lying in a direction forwards and inwards, pus, together with some dark blood clot, flowed freely along the groove of the director, and still more freely on gently dilating the incised track with a pair of sinus forceps. This was gently washed away with a stream of corrosive sublimate solution (1 in 5000). When pus would no longer flow, we reckoned that about an ounce to an ounce and a half had been evacuated, but this estimate is liable to error.

Into what then seemed the main abscess cavity, lying at a depth of about two inches, in a direction forwards and inwards, a small hydrocele canula was passed, a gum catheter being substituted for the trocar. Through this canula a flexible catheter was inserted, which served as an irrigating tube for washing out the supposed cavity with the weak corrosive sublimate solution. A piece of india-rubber tubing, about a quarter of an inch in diameter, and about two inches long, was finally inserted, and left for drainage. I should mention that no bleeding whatever accompanied any of these procedures.

The flap of dura mater was left unsutured, and tucked away at the lower part of the trephine hole, so as not to obstruct the tube. The scalp flap was split by an incision, running parallel to the vessels, in such a way that the anterior segment when replaced just cleared the orifice of the drainage tube, and was accurately and closely sutured. The posterior flap was also replaced in such a way that the drainage tube emerged between the two scalp flaps, the rest of the trephine hole being completely covered up by these. Underneath this posterior flap, a small sized drainage tube was placed, passing from the region of the trephine hole, and emerging at the lowest margin of the wound in the recumbent position. This arrangement was intended to hinder any discharge from gravitating downwards, and collecting under the scalp. Iodoform powder was dusted over the wound, and the ordinary gauze dressings applied. On being removed to his bed after the operation, the patient's condition was as follows:—Pulse 84, fairly good; breathing somewhat stertorous; respirations 19 per minute. Pupils dilated, the left more so than the right; reaction to light of both irides doubtful; conjunctival reflex present. Ptosis of left eye, and corresponding cheek puffed out on expiration; left angle of the mouth "screwed up" on being aroused, when he seems to understand what is said to him. He can move his arms, the left freely, but the right to a slight degree only.

At midnight the patient was rational, could answer questions, and could move his right arm much better than before the operation.

Nov. 18, 7.30 a.m.—The tongue is dry, and cannot be protruded. Left ptosis; both pupils still widely dilated, especially the left; right iris reacts to light, the left not at all; left eyeball almost fixed, with slight movement, only outwards. He is drowsy and aphasic, but seems to understand what is said to him. Pulse 96. Ordered hydr. subchlor., gr. iij. At 10.30 a.m. the dressings were changed. There has been no discharge of pus from the tube, which is patent. No bulging nor protrusion of brain.

Nov. 19, 10.30 a.m.—He can move his right arm and hand, and button his shirt with it. The ptosis of left eyelid continues, but he can partially raise it with his occipito-frontalis. Both pupils dilated, with same excess of left side. Reaction to light of right iris, none of left; slight divergent strabismus of left eye, which is immobile; right eyeball moves freely in all directions.

Nov. 20.—The tongue moist, furred; cannot protrude it. Ocular symptoms unchanged, but there is rather less facial paralysis.

Nov. 21.—Tongue moist; makes the effort to protrude it without success. There is evidently increased power in the right facial muscles, and he can move the limbs on the right side, on which there is no loss of sensation.

Nov. 22.—General condition the same.

Nov. 23.—On dressing the wound, there is evidently some discharge of pus, but it is quite sweet. A rather larger drainage tube inserted.

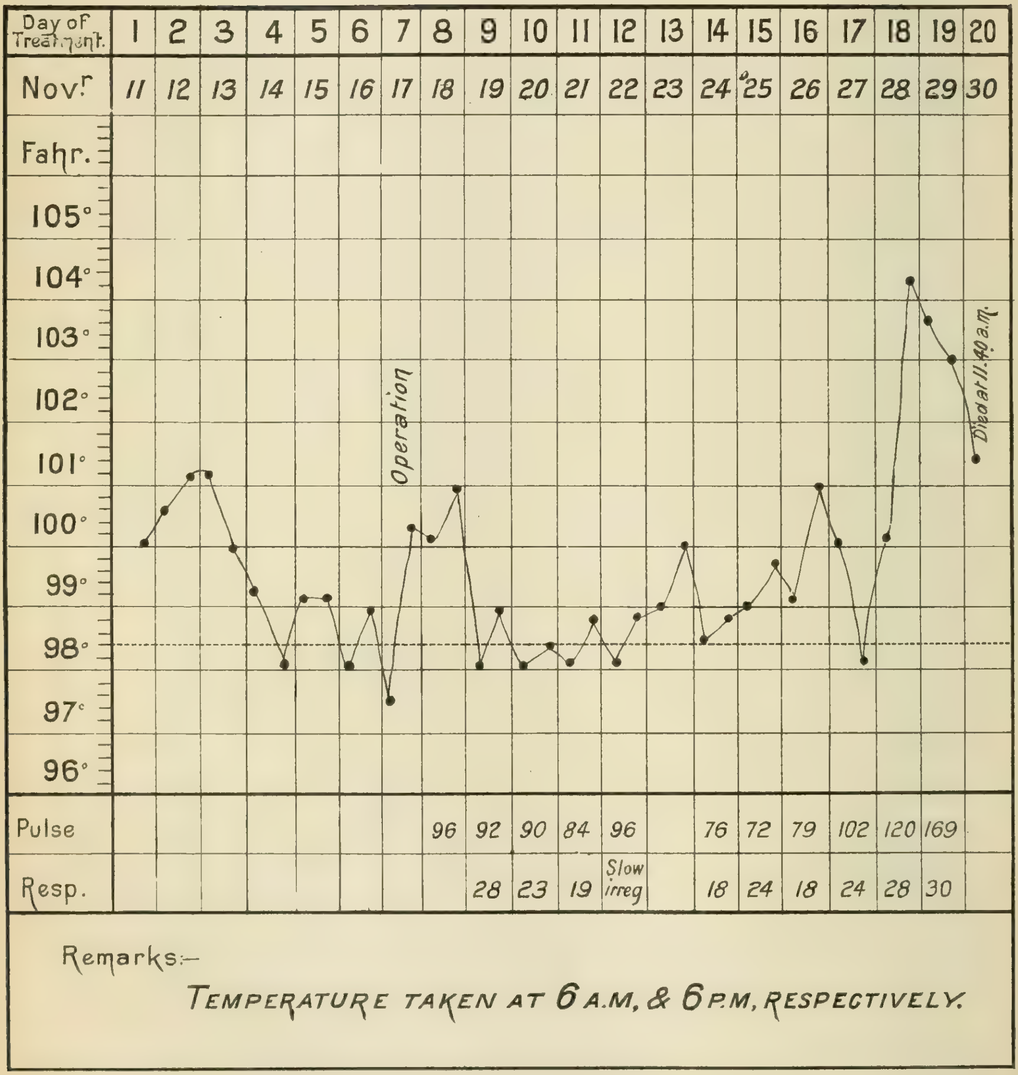
Nov. 24.—Very restless and delirious during the night. Pupils unequal, but the left is diminished in size, and the iris acts a little to light; otherwise the paralytic symptoms are apparently unchanged. On the other hand, his mental condition is decidedly less favourable, as the hebetude is markedly increased. In his restlessness this morning, he managed to displace the bandages, and with them the drainage tube was withdrawn, but they were replaced almost immediately by the house surgeon. On dressing the wound early in the forenoon, there was found to be a distinctly increased discharge of pus, which is however quite sweet. Later in the day, at 4 p.m., he was found to have complete paralysis of motion on the right side, and on removal of the drainage tube, it was found to be full of offensively-smelling and disintegrating blood clot. On gently probing the depths of the cerebral wound with the director, pus of the same character escaped along the groove. The wound was well washed out, and a fresh tube inserted.

Nov. 25.—Has passed a restless night. Left pupil less dilated; no reaction of iris to light; that of right eye acts. Facial paralysis more marked; incontinence of urine. Later, at 8 p.m., he was very drowsy and lethargic.

Nov. 26.—Paralysis of right side, persistent and marked, but he can move the left leg. There is some difficulty in swallowing, some of the fluid regurgitating. Makes no effort to protrude tongue; incontinence of urine. Endeavours to pull the bandages off. On dressing the wound, pus mixed with blood and softened brain substance escapes when the tube is removed. There is also some hernia cerebri. There seem to be two distinct tracks leading into the interior of the brain—one inwards and forwards, and the other more directly inwards or a

Drs. Verco & Stirling

Name H.W.



little backwards, into either of which the drainage tube passes easily. The former is that into which the tube has previously been placed, and through which most of the discharges have come. Depths of wound washed out by irrigating through a flexible catheter.

Nov. 27.—Is very drowsy, and in about the same condition as yesterday, but there is more discharge from the wound, which, however, is less offensive.

Nov. 28.—Restless during the early part of the night, but subsequently slept quietly. There is still difficulty in swallowing, but he is taking more than on the previous two days. Paralytic symptoms as before. Does not speak, but seems to understand what is said.

Nov. 29.—Semi-comatose all night, scarcely stirring. Will drink a little. Incontinence of urine. Bedsore commencing over sacrum. Evidently sinking.

Nov. 30.—Comatose, with apparently complete paralysis of extremities. Sinking fast. Died at 11.40 a.m.

The temperature never rose above 101·3°, until about 36 hours before death, when it reached 104·4°.

Post-mortem.—There was no general meningitis, but the left third nerve was flattened, and involved in some lymph in the subarachnoid space at the base. There was no adhesion of the left temporo-sphenoidal lobe to the dura mater over the petrous bone, but the membranes were adherent to the brain substance at, and immediately around, the trephine wound. The brain substance at this point was softened, of an almost black colour, and fœtid. From the external wound two tracks were discovered, one passing almost directly inwards, through reddened and softened brain substance, into the lateral ventricle, just at the junction of the middle and posterior horn; the other passing inwards, forwards, and towards the base, through soft dark brain tissue nearly to the tip of the middle lobe, and into a cavity with a greenish-gray lining, which communicated at one point by a small opening with the lowest part of the middle horn of the lateral ventricle, and also with a second small cavity in the extremity of the temporo-sphenoidal lobe. The left side of the brain for a considerable area around the seat of operation was softened and reddened, but there was no adhesion to the dura mater, nor any effusion of plastic lymph, except in the immediate neighbourhood of the surgical wound. The left temporal bone was removed and examined. The centrepiece of the trephine had been placed at a point one inch and a half above the centre of the external auditory meatus, and half an inch behind. On stripping off the dura mater, there was seen an eroded surface of bone, of an irregularly lozenge shape, the long diameter extending downwards and forwards along the line of junction of the squamous and petrous portions of the temporal bone. The posterior end of this eroded surface just touched the lowest point of the trephine hole. Its width was about three quarters of an inch, half an inch of this being on the upper surface of the petrous bone. Here there was a ragged perforation running vertically into the substance of the bone. In the groove for the lateral sinus, just after it makes its curve from the horizontal to the vertical portion, that is on the posterior part of the petrous bone, about half an inch from its supero-posterior edge, was an irregular hole, one quarter of an inch by one eighth of an inch in size. Probes put into these two perforations touched one another. On opening

the tympanum internal to these apertures, it was found, like them, filled with inspissated pus; and on removing this, the walls were felt bare of membrane. The malleus and incus were present, but water injected into the external meatus flowed freely through this hole in the tympanum, demonstrating the absence of the membrana tympani. From the upper part of the cavity of the tympanum, a probe passed directly outwards, under an extremely thin shell of bone, and parallel with, but above the meatus, to the perforations described on the upper surface of the petrous bone, and also outwards, backwards, and downwards to the large perforation in the groove of the lateral sinus. Inspissated pus lay between the dura mater and the skull, over the carious bone on the upper surface of the petrous portion of the temporal, but no perforation of the dura mater existed. There was no separation of the dura mater at the back of the petrous bone in the groove of the lateral sinus, nor was the sinus obliterated by ante-mortem clot.

Remarks by Dr. Verco.—The symptoms on which the diagnosis was based have been already briefly mentioned, and the incidents of the operation; and the post-mortem appearances confirmed it. There had evidently been old-standing ear disease, as evidenced by the caries of the temporal bone. This possibly existed five years before, and was the occasion of the head symptoms, relieved by the discharge from the ear. It is scarcely possible that such extensive caries could have arisen as recently as one month before admission. The amount of otorrhœa, however, must have been very scanty, for not only were both the man and his wife ignorant of its existence during his last illness, but the house surgeon's note was positive against it; and when I examined the patient with the otoscope, it only existed as a little thickened secretion in the deeper part of the meatus, somewhat blocking the speculum. This caries had caused subdural suppuration over a limited area on the upper aspect of the petrous bone, and the inner surface of the squamous bone. The collection was, however, small, and at the post-mortem was not noticeable until the dura had been stripped from the bone. Simultaneous with this subdural suppuration, which was altogether inadequate to account for the cerebral symptoms, there arose a localised collection of pus in the substance of the temporo-sphenoidal lobe, about its centre, rather towards its tip; and this, by its pressure during its unusually rapid increase, caused the neuralgia in the dental branches of the fifth, the aphasia, facial palsy, and hypæsthesia. The formation of this abscess may have dated from the left temporal headache of five weeks' duration; though more probably this symptom was due to the subdural temporal suppuration, while the commencement of the central suppuration just a little preceded the dental neuralgia of Nov. 5th. This explanation presupposes a very rapid suppurative process in the brain tissue, beyond what is generally observed in abscesses secondary to ear disease; but it accords with the unusually rapid march of symptoms while under observation. The desperate condition of the patient, within twenty-four hours after the first visit of the physician, justified any operation that held out the barest possibility of life; and the considerable improvement after its performance vindicated the action taken. The paralysis of the right arm and leg, noted when the coma disappeared, was doubtless a pressure effect, for after the operation the power of movement was markedly restored. The hemiplegia, which

recurred later, was due to extension of softening into the internal capsule. The paralysis of the left eye did not disappear; the third nerve was too much affected from the pressure antecedent to the operation to admit of restoration of its function before the destructive softening attending cerebritis; this cerebritis, causing softening, was almost certainly the cause of death. Whether it originated subsequent to the operation, or whether it had begun before this was undertaken and afterwards spread, it is impossible to determine. Had not the lateral sinus been found patent, and containing only a coloured post-mortem clot, the softening might have been attributed, in great part, to phlebitis of this vessel, from caries of the bone in its groove; but it showed no signs of disease.

Remarks by Dr. Stirling.—After the observations of Dr. Verco (with which I entirely concur), and the report of the incidents of the operation, there is little to be added from a surgical point of view. The strong recommendation of Mr. Horsley induced me to reflect the scalp by a semicircular flap instead of by a crucial incision; but whatever may be the advantages of the flap in allowing accurate replacement, and firm and uniform pressure over the brain at the bony vacancy, it certainly does not seem to afford the same facilities for the fixing and exit of a drainage tube as the crucial incision. However, by the arrangement adopted, it was possible to carry this out efficiently, with fairly accurate replacement of the reflected scalp; at no time, in fact, was there any bagging of pus or hindrance to the exit of discharges. The allusion to the inequality in the thickness of the skull at the part trephined will be confirmed by the statement, that at the lower and posterior part of the opening it was rather over a quarter of an inch in thickness, while at the lower and anterior it was not quite a sixteenth of an inch. The absence of bleeding from the incised brain has been already mentioned. The strict antisepsis adopted throughout the operation and the subsequent dressings was effectual until the eighth day; and it is possible, that the putrefactive changes which were then observed were caused by the exposure, due to the accidental shifting of the dressings by the patient's restless movements; but, on the other hand, it is probable that the rapid extension of the cerebral inflammation had begun before this happened, and was, in fact, the exciting cause of the restlessness which so soon culminated in coma and paralysis.

It must always be a matter of extreme anxiety and difficulty in such cases to decide upon the time when the drainage tube may be safely dispensed with; and I made every endeavour to act with judgment, by gradually reducing the length and the calibre of the tube in conformity with the amount of discharge.

After the marked improvement that followed the operation for several days, the result was of course disappointing to us, but in the light of the post-mortem revelations, recovery must, from the first, have been very doubtful. If we had been aware of the extensive necrosis that existed at the squamo-petrosal junction, the proper course would have been to enlarge the trephine opening downwards, and so to permit of the escape of the pus in that locality; but even then it is scarcely possible to hope that, with disease of such rapid onset and progress, a fatal result could have been averted. Still, under all the circumstances of the case, we believe that we were fully justified in the adoption of extreme surgical measures.

A FEW OBSERVATIONS ON SOME CASES OF CANCER OF THE BREAST, WITH A TABLE OF FORTY-SEVEN CASES.

By F. Milford, M.D.

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In the year 1877, I read before the Medical Section of the Royal Society of New South Wales, a short paper, which I called "Observations on some Cases of Scirrhus Cancer of the Mamma." This was afterwards published in the *Australian Practitioner.* As the subject is therefore not entirely unfamiliar to me, I trust I shall not bore you in continuing a record of some few more cases.

That locality has a great influence on the prevalence of cancer, has been shown by Haviland, who has searched the Registrar-Generals' reports throughout England for the principal habitats of the complaint. It is not known in the Arctic regions or Frigid zones; is not common in the Tropics; but is more often found in large cities than in country places. The investigation committee, who are using their utmost exertions to become intimate with the history of cancer in England, state they only know of one case originating in a person who has lived 1000 feet above sea level. They are of opinion that the character of the soil and subsoil influence its presence.

I beg to show you a table compiled from the records of the Registrar-General, showing the number of deaths taking place in Sydney and suburbs during the years 1880 and 1885 inclusive, and the proportionate number of males and females dying from cancer.

I find that in the city of Sydney, 1 female dies in proportion to 42·85 of deaths from other causes. In the suburbs, 1 dies in proportion to 58·53 from other diseases; showing the much greater liability to the disease in the town, than country. The average mortality of city and suburbs among females is 1 to 50·7. The average mortality in males in the city of Sydney is 1 to 64·9; in the suburbs, 1 in 81·7—1 death in 73·7 cases of both town and country. The proportion is also thus seen to be much greater in the city, among males, than in the country. The proportion of deaths from cancer among females, during the six years, is much greater than in males. While 1 female dies out of 50 with this complaint, 1 male out of 73 only succumbs, or nearly 3 females for 2 males.

In my 1877 paper, I stated that throughout New South Wales the mortality among males and females was 1 in 59·5. In Sydney and suburbs it was, during the years 1880 to 1885, 1 in 66·19.

It devolves upon us as guardians of the public health, if possible, to devise prophylactic measures to prevent the attack of this complaint, and it will undoubtedly repay us to ascertain what is the best mode of treatment after it is implanted in the living tissues.

There is little doubt that the disease is chiefly induced by injury to the part, whether that be caused by constant irritation or sudden violence. In inquiring the history of a patient—should we find that she

has a cancerous inheritance and an eczematous rash, or a hard scar from a wound, or nodule—the result of a blow, or has been in constant intercourse with a cancerous person—the question might arise, would we be justified, as a prophylactic measure, in removing the breast? In any case with a history of cancerous inheritance, I think it will be necessary to recommend your patient to take the greatest care of the mammary glands, to prevent these being injured and exposed to sudden changes and vicissitudes of the weather. Should a patient present herself to a surgeon with a tumour in the breast, his first duty will be to ascertain whether it be of a malignant character or not. Having satisfied himself it is a cancer, his next question should be, what is the best mode of treatment? In our present imperfect knowledge of the disease, we are still sure that if left uninterfered with, the disease will go on from bad to worse, until death closes the scene. I am not aware of, nor do I think there is, any record of a spontaneous cure of cancer. My nearest experience is recorded in my 1877 paper, in the case of Ellen J., aged 40, who lived three years afflicted by the disease, and had early secondary deposits in the lungs. She had an ulcerated hard scirrhus tumour of the left breast, which sloughed, the whole of the gland coming away, and the resulting ulcer then healed; but this was after the whole of the system was more or less affected, the left lung being solid from cancerous deposits.

We are satisfied, therefore, that if left alone—should she not die early from some other cause—the disease must eventually kill her. Hence, in the present state of our knowledge, it will be our duty to ascertain whether she be in a fit state to submit to an operation of a curative nature, to entirely rid her of the complaint; of a palliative nature, to modify the effects of the disease; or one for the purpose of simply prolonging life for a short time, by preventing hæmorrhage, restraining discharges, or relieving acute pain. We should carefully weigh the benefits likely to follow an operation, and the risks. There are some surgeons much in favor of the operation, others prejudiced against it.

In 61 cases quoted by Paget, which were not operated on, but underwent palliative treatment, 29 lived from 3 to 20 years, while the remaining 32 died at between 6 and 30 months. He gives an average of two years' life to encephaloid growths, of four years to scirrhus.

According to Gross, 146 cases had come under his observation whose history he could trace subsequent to the operation. The duration of life in these cases was an average of 5 years and 9 months—a considerable advantage in favor of an operation. He does not, however, say whether the operation was intended to be curative or palliative.

Gross himself is a believer in the *curative powers* of a thorough operation undertaken in the early stages of the disease, during which the whole of the breast, skin covering it, and axillary glands, together with the pectoral fascia, should, he thinks, be removed. Erichsen, in his 1888 edition, and others, support him in similar terms. The extirpation of the tumour can only be done by knife, caustics, or cautery, and, if thoroughly performed, may rid the patient entirely of the complaint. The knife is, of course, the most efficient of these measures.

Gross claims by his operation to cure 30 per cent. of his cases, if taken at an early stage, before the disease has spread far into the neighbouring tissues.

I see no reason why this mammary form of the disease should not be eradicated from the body, when the labial so frequently is. We all know how many useful lives have been saved by the simple V incision in the lower lip affected with epithelioma.

As a curative or palliative measure, or for the purpose of preserving life by preventing hæmorrhage or relieving intense agony, it is the duty of the surgeon in some cases to operate, first explaining to the patient or her friends the motives that influence him. It remains with her to choose whether she submit or not.

In mentioning the operation to his patient, it would not be correct for the surgeon to ignore the immediate dangers of it, which according to Gross, as stated in his paper on "Carcinoma of the Breast"—published in the April number of 1888 of the *International Journal of Medical Sciences*—constitute a mortality of 1 to 7 from the immediate effects of the operation.

In my paper of 1877, I record that out of fourteen cases operated on, only one died from the immediate effects, or rather, from an attack of pleurisy coming on on the third day after it; the other thirteen survived, these cases undergoing secondary operations at the return of the disease in or about the neighbourhood of the cicatrix of the first operation. This is an improvement on Gross' statistics, but I have here a table of forty-seven cases, all of which have had the mammary glands excised, and many the axillary glands as well.

In recording these cases, I have endeavoured to get as much information with regard to them as was possible, but I am sorry to say that in many instances I have not been able to procure a history subsequent to the operation, and in some cases a most imperfect and unreliable one previous to it. I give as nearly as I can the name of the patient, whether married, single, or widow; the age when disease was first perceived by the patient, the date when it was first perceived, date of first operation, by whom performed, date of return of disease, date of second and subsequent operations, by whom performed, date of death, age at death; if alive, age at present, and state of health, with the duration of the complaint. I am indebted for twenty-three cases to the courtesy of the authorities at St. Vincent's Hospital; to Dr. MacCormick, of the Prince Alfred Hospital, for fourteen of his own cases; and to Dr. Goode for seven of his.

In these forty-seven cases two deaths only occurred from the immediate effects of the operation, one in a woman (No. 33 of the series) aged 42, who had a large fungating encephaloid mass projecting from the mamma, which bled freely, the operation being undertaken to prevent further hæmorrhage. She died exhausted on the fifth day. The other patient died during the administration of chloroform before she was touched by the scalpel. Leaving this case out, one patient only died out of forty-six; taking it as belonging to the series, one out of 23·5 is the proportion, a marked improvement on Gross's one in seven.

The duration of life of a patient, who has suffered from the disease and borne the operation, can be exemplified in the table; but only in those

in which there has been a subsequent history after operation, and the patient has left the hospital. I find thirty-five cases have this history, ten of which are known to be alive. In these, the disease has lasted in one case, two months; in one, one year; in one, one year and a half; in five, two years; in one, two and a half years; in one, three years. Of which cases those numbered 24, 25, and 29 are now enjoying excellent health, the remaining seven are suffering more or less under the return of the complaint.

Of the other fifteen cases, whose deaths are recorded with a history, in two, disease lasted one year; in three, two years; in one, twelve years; in one, thirteen years; in one, fourteen years; or an average of three years and nine months for the fifteen cases.

The forty-seven patients consist of twenty-three married women, fifteen single, and nine widows.

After the operation, disease returned in nine cases of which there are histories. In these it showed itself in the space of time mentioned as follows:—In No. 2 case, in three months; in No. 10, in four months; in No. 15, in four months; in No. 22, in five months; in No. 26, in six months; in No. 27, in four months; in No. 28, in one month; in No. 71, in eighteen months; in No. 76, in one year; or an average in the nine cases of four months.

The youngest operated on was at 23 years of age, the eldest at 68. More than half (twenty-six) were operated on for the first time at between 40 and 50 years of age. The age of the forty-seven cases averaged between 42 and 43 years at operation.

The tenth case (Mrs. Jolly's) is a remarkable one. This patient had the left breast removed in Nov. 1875, the disease first having been noticed in 1872. She had eight subsequent operations for the removal of recurrences, and died in 1885, with the liver and other internal organs affected.

Case 35 of the series shows an excellent result. Although there was an enormous mass of diseased glands and other tissue, Dr. MacCormick, the operator, determined to remove it, and finding it impossible to excise the mass without injuring the axillary vein, he ligatured it in two places, and cut out the piece between. There was no œdema of the arm, or other bad results from this procedure.

I have no instances in this series of cases unoperated on—they have all undergone the operation—so that in comparing the duration of their life with those who have not been interfered with, I must fall back on my 1877 series.

I find after reference to it, that there were five cases mentioned who died without operative interference. In these, cancer commenced while suckling; out of these, one lasted one year, another six months; while the other three lived respectively two, three, and nineteen years, giving an average of five years and two months to each.

The average duration of life in those operated on in the present series, of whom we have a history, gives only three years and nine months, which is in favour of non-interference; those who were not operated on living eighteen months longer than those who were.

There is no history recorded in these forty-seven cases of any person being cured by the operation.

I think the majority of the profession will however agree with me, as to the advantage to be gained in thoroughly following out Gross's plan, when excision is practised as a curative measure. The question will occur also, will you be justified in performing a palliative operation if you consider it impossible to remove the whole of the disease, and no ulceration is present? or if the patient be suckling, or the mamma inflamed? The answer, in my opinion, should be in the negative.

After all, this operation is a very barbarous procedure, similar to that practised 2000 years ago. May we not entertain the hope that one of our numerous distinguished pathologists may in the near future find a way to prevent the excessive formation of cancer cells, rather than to cut them away from the living body with a knife, as a woodman would a rotten limb of a tree with an axe; or burn them with a red hot iron, as a labourer would a heap of rubbish in the corner of a back yard. Our hope must be in the future, not only by use of prophylactics to prevent its advent, but by properly constituted therapeutic measures expel the disease when present. Whether the excessive growth of the epithelial cells depends upon a microbe, bacillus, or other microscopic creature; on the excess of white blood corpuscles in the system, or on some other morbid idiosyncrasy of the constitution, it is quite evident therapeutic measures are required to restrain the rapidity of their increase.

"A cure for cancer" has been the usual cry of the quack during the generations; but it should now be the hope, the wish, and the summit of ambition of practitioners of this age and hemisphere, to realise it by other methods than excision.

In the meanwhile let us congratulate ourselves that at least one operator has had such successful results—I refer to Gross, of Philadelphia, who claims 30 per cent. of cures. He considers if the disease has not returned in three years, the patient is cured. My present series of forty-seven cases have twenty-five histories, and only one has lived three years without return; of the other twenty-two cases, let us hope that many have been cured. According to Gross, who claims a cure when no return occurs after three years, there is only one in twenty-five cases. In my 1877 series of nineteen cases, the second case was operated on when the patient was 30, and there was no return at her death, at 65—a perfect cure, the only one in fifteen operations.

No. of Case.	Name of Patient.	Married, Single, or Widow.	Age when Disease First Appeared.	Date when Disease First Appeared.	Date of First Operation. By whom Performed.	Date of Return of Disease.	Date of Second and Subsequent Operations.	Date of Death.	Age at Death.	Age at Present.	State of Health at Present and Duration of Disease.
1	M. F.	Married	59	Jan. 1876	Dr. Schuette Jan. 22, 1876	..	..	Jan. 1878	61	..	Left hospital cured ; died from pneumonia, two years.
2	M. M.	Widow	56	..	Dr. Schuette May 31, 1877	..	..	Aug. 3, 1877	57	..	No history ; died twelve weeks after operation, one year.
3	M. C.	Single	42	Jan. 1879	Dr. Milford July 6, 1880	..	..	Dec. 12, 1880	44	..	Two years left hospital cured ; no subsequent history after operation.
4	M. T.	Single	36	..	Dr. Milford Sept. 30, 1881	..	..	..	..	..	Left hospital cured ; no subsequent history.
5	A. K.	Widow	60	..	Dr. Milford Dec. 20, 1881	..	..	..	..	..	Left hospital cured ; no subsequent history.
6	M. H.	Single	59	..	Dr. Schuette Oct. 29, 1881	..	..	..	..	..	No subsequent history after leaving hospital, cured.
7	M. McA.	Married	41	..	Dr. Milford April 20, 1882	..	..	..	..	..	Left hospital cured ; no subsequent history.
8	E. C.	Married	41	..	Dr. Schuette April 23, 1882	Aug 1882	..	Dec 1882	42	..	Returned to hospital to die ; disease lasted one year, after leaving.
9	E. G.	Widow	60	..	Dr. Milford Jan. 6, 1882	..	..	..	..	..	Left hospital cured ; no subsequent history.
10	Mrs. J.	Married	45	Nov. 1872	Dr. Schuette Nov. 1875	Feb. 1876	And eight(8) other operations June 11, 1876	1885	58	..	This patient was operated on nine times at St. Vincent's ; internal organs affected at death ; disease lasted thirteen years.
11	Mrs. F.	Married	40	Jan. 1 1883	Dr. O. Maher May 30, 1884	..	..	Jan. 1886	42	..	Left hospital cured ; no subsequent history, except her date of death.
12	J. L.	Single	55	..	Dr. Chisholm Dec. 11, 1888	..	..	..	..	..	Left hospital cured ; no subsequent history.

No. of Case.	Name of Patient.	Married, Single, or Widow.	Age when Disease First Appeared.	Date when Disease First Appeared.	Date of First Operation. By Whom Performed.	Date of Return of Disease.	Date of Second and Subsequent Operations.	Date of Death.	Age at Death.	Age at Present.	State of Health at Present and Duration of Disease.
13	M. C.	Single	49	..	Dr. O. Maher June 16, 1885	Aug 1885	..	Sept. 1885	50	..	Left hospital cured; went under a cabman's treatment, and died in a month; duration of disease one year.
14	Mrs. M.	Married	45	.	Dr. O. Maher Nov. 20, 1886	Jan. 1887	..	Feb 1887	46	..	Died a month after leaving hospital, from return of the disease; duration one year.
15	M. M.	Single	46	..	Dr. Williams Sept. 11, 1887	..	January 1888	March 1888	47	..	Died in Prince Alfred Hospital, twelve months after leaving St. Vincent's Hospital; one year.
16	Mrs. C.	Married	42	..	Dr. Williams Nov. 28, 1886	Jan. 1887	..	July 1887	43	..	Left hospital 23rd December, 1886; disease lasted twelve months; died from lung affection.
17	M. W.	Single	40	..	Dr. O'Dogherty Jan. 22, 1887	March 1887	..	July 1887	41	..	Left hospital cured, and died six months afterwards with cuirass hardness of skin.
18	M. A. L.	Single	23	April 1885	Dr. O'Dogherty April 27, 1887	..	..	..	..	..	Left hospital cured; returned to Queensland: no subsequent history.
19	M McI.	Single	39	..	Dr. Chisholm Aug. 28, 1887	..	.	..	.	..	Left hospital cured, 13th October, 1887; no subsequent history.
20	M. Q.	Widow	68	..	Dr. Williams July 14, 1888	..	..	..	..	..	Left hospital cured, 29th February, 1888; no subsequent history.
21	C. R.	Married	45	..	Dr Chisholm Feb. 10, 1888	..	..	..	..	..	Left hospital, 28th July, 1888; no subsequent history.
22	Miss McH.	Single	40	Oct. 1884	Operator unkn'wn Nov. 1887	March 1888	Dr. McCarthy Sept. 3, 1888	..		..	Left hospital cured, 9th October, 1888; no subsequent history.
23	C. B.	Married	53	..	Nov. 18, 1888	..	..	..	..	..	In St. Vincent's Hospital, present date, December 22nd, 1888.
24	M. B.	Single	42	March 1887	Dr. Milford April 1887	..	..	..	..	43	Cured; continues in good health; 21 months.

No. of Case.	Name of Patient.	Married, Single, or Widow.	Age when Disease First Appeared.	Date when Disease First Appeared.	Date of First Operation. By Whom Performed.	Date of Return of Disease.	Date of Second and Subsequent Operations.	Date of Death.	Age at Death.	Age at Present.	State of Health at Present and Duration of Disease.
25	L. C.	Single	35	July 1887	Dr MacCormick Nov. 2, 1887	..	..	..	..	37	Left Prince Alfred Hospital cured, 1st January, 1888; no return, two years.
26	J. H.	Married	47	Aug. 1886	Operator unkn'wn Left breast removed Dec 1886	Return in right breast, June 1887	Dr. MacCormick December, 1887	Sept 1. 1888	49	..	After second operation, removal of right breast; return in old cicatrix, left breast; death; duration two years.
27	A. C.	Married	65	June 1887	Operator unkn'wn October 1887	..	Jan 11, 1888	..	..	67	Health fair; returned in axilla, April 1888; duration one and a half years.
28	L. C.	Single	34	March 1888	Dr. MacCormick Aug. 8, 1888	..	..	..	..	34	Return in cervical glands; health bad; nine months.
29	J. S.	Widow	60	April 1888	Dr MacCormick Nov. 1, 1888	..	..	..	..	60	Cured; no return up to December 12th, 1888; six months.
30	M. C.	Married	42	Oct. 1886	Dr. MacCormick April 15, 1887	..	..	..	..	43	Discharged; and no subsequent return for twenty-one months; duration of disease, two years and three months.
31	E. B.	Married	47	Jan. 1883	Dr. Fiaschi July 1884	June 1885	Dr. MacCormick Jan & Mrch. 1886	April 1886	50	..	Death from alcoholism; Dr. MacCormick performed two secondary operations; duration three years.
32	S. E.	Widow	34	1874	Dr. MacCormick April 1886	July 1886	..	July 1886	48	..	Dr. MacCormick's operation to prevent hæmorrhage; died five days after, from exhaustion.
33	J. R.	Widow	42	1874	Dr. MacCormick July 9, 1886	..	..	July 12 1886	..	50	This operation was undertaken for same purpose as preceding; lasted two years after; duration of disease eight years.
34	J. D.	Single	41	May 1885	Dr. MacCormick July 24, 1886	..	..	..	..	42	Discharged cured; no subsequent history.
35	C .M.	Married	40	April 1886	Dr. MacCormick August 1886	..	..	..	..	42	No return of disease up to December 22nd, 1888; health excellent; duration two and a half years.

No. of Case.	Name of Patient.	Married, Single, or Widow.	Age when Disease First Appeared.	Date when Disease First Appeared.	Date of First Operation. By Whom Performed.	Date of Return of Disease.	Date of Second and Subsequent Operations.	Date of Death.	Age at Death.	Age at Present.	State of Health at Present and Duration of Disease.
36	C. H.	Married	41	Sept. 1886	Dr. MacCormick July 6, 1887	Feb. 1887	Dr. MacCormick March 6, 1887	..	42	..	Death from cancer of stomach three months after second operation.
37	M. W.	Married	34	..	Unknown	..	Operated on affected part previously. Dr. MacCormick	1888	35	..	Death from cancer of lungs a few months after operation.
38	M. L.	Married	54	Jan. 1887	Dr. MacCormick Sept. 15, 1887	..	..	..	..	55	Excellent recovery ; good health ; no return at present, December 22nd, 1888 (fifteen months).
39	A. H.	Married	37	Feb. 1887	Dr. MacCormick Oct 12, 1887	..	..	..	..	39	Excellent recovery ; is now in perfect health—two years.
40	Mrs. W.	Married	40	..	Dr. Goode April 20, 1883	..	..	..	..	..	Discharged cured ; no subsequent history.
41	E. H.	Single	33	..	Dr. Goode Nov. 18, 1885	..	..	..	..	..	Good recovery ; no subsequent history.
42	Mrs. G.	Widow	40	..	Dr. Goode Dec. 9, 1885	..	..	..	..	42	Good recovery ; no return—December 22nd, 1888 ; excellent health.
43	K. MacD.	Single	49	..	Dr. Goode August 4, 1886	..	..	..	..	51	Good recovery ; no subsequent history, except that she is alive.
44	Mrs. H.	Married	39	..	Dr. Goode August 4, 1886	..	..	..	..	40	Good recovery, no subsequent history.
45	M.	Widow	47	..	Dr. Goode October 12, 1887	March 1888	..	..	..	48	Dr. G. removed axillary glands, as well as mamma ; returned in cicatrix six months afterwards ; is now suffering ; disease has lasted fifteen months.
46	M. H.	Single	41	..	Dr. Goode Jan. 26, 1888	..	..	..	..	..	Good recovery ; no subsequent history.
47	M. A. W.	Married	49	..	Dr. Goode Feb. 29, 1888	..	.	Feb. 29 1888	49	..	This patient died from chloroform, before being touched with the scalpel.

Table of Deaths of Females in Sydney and Suburbs, from 1880 to 1885 inclusive, with the Number and Proportion of Female Deaths from Cancer.

Year.	Total Deaths in Sydney.	From Cancer.	Total Deaths in Suburbs.	From Cancer.	Proportion of Deaths from Cancer in Sydney.	Same in Suburbs	Same in Sydney and Suburbs.
1880	1275	22	1048	16	1 in 58·00	65·05	61·75
1881	983	26	1020	18	1 in 37·08	56·06	47·07
1882	1114	26	1159	21	1 in 42·07	55·03	49·00
1883	987	29	1299	22	1 in 34·00	59·00	46·05
1884	1121	25	1576	32	1 in 44·08	49·25	52·15
1885	1185	30	1807	28	1 in 39·08	64·05	—
Total	6665	158	7909	137	1 in 42·85	58·53	50·65

Total deaths of females in Sydney and suburbs, 14,574. Of these, 295 died from cancer, about 1 in 50.

Total Deaths of Males in Sydney and Suburbs, from 1880 to 1885 inclusive, with the Number and Proportion of Male Deaths from Cancer.

Year.	Total Deaths in Sydney.	From Cancer.	Total Deaths in Suburbs.	From Cancer.	Proportion of Male Deaths from Cancer to General Male Mortality in Sydney.	Same in Suburbs.	Same in Sydney and Suburbs.
1880	1465	70	1132	17	48·8	66·05	57·65
1881	1263	18	1086	17	71·7	63·88	67·79
1882	1246	20	1416	17	62·3	83·02	72·07
1883	1414	16	1815	20	88·3	90·07	89·09
1884	1411	29	1338	14	48·5	88·04	68·04
1885	1451	21	2050	21	69·9	97·06	83·15
Total	8250	134	8837	106	1 in 64 9	1 in 81·07	1 in 73·19

Total deaths of males in Sydney and suburbs thus amount to 17,087, those caused by cancer 240, or one death in 73·19; or a less number in proportion to the females' deaths by about 26 per cent., or about two males die of cancer when three females do.

The proportion of both males and females dying from cancer in Sydney and suburbs is 1 to 66·19.

ON THE USE OF SPECIAL EXERCISES, AND OF ACTIVE AND PASSIVE MOVEMENTS, AS AN AID TO SURGICAL TREATMENT.

By R. E. Roth, M.R.C.S. Eng.

My chief object in bringing the above subject before your notice is the hope that it may help to supply a want felt among several of my colleagues who, when referring to some of the various methods of treatment recommended in orthopædic text-books, find certain systematic exercises (rubbing, &c.) recommended, but learn nothing as to the *methods* and *manner* in which such treatment is to be employed. Information also is very scanty as to the cases where such treatment by special exercises and movements is applicable and advantageous.

Without doubt, the best and simplest scientifically-devised exercises, founded on sound physiological and anatomical principles, are those drawn up by Ling, and known as the Ling's or Swedish System of Gymnastics, where each individual exercise has been studied and constructed with regard to its effect. The whole system is divided into four parts, to meet the requirements of educational, æsthetic, military, and medical purposes.

In the first, "exercises, with and without gymnastic apparatus," are made use of, and they are perfectly sufficient, when rationally applied, for the harmonious development of the body.

The "æsthetic" part is intended to teach the expression of ideas and sentiments by means of positions and movements, and is of great use for actors, orators, painters, sculptors, &c.

The "military" is based on the pedagogic branch, to which are added sword, foil, and bayonet exercises, &c., necessary to the thorough training of the soldier.

The "medical" or "movement cure" comprises special exercises devised for the treatment and cure of many chronic diseases and deformities; it consists of active movements with or without assistance or resistance, of movements with special apparatus, and of passive movements usually grouped together as "manipulations."

Active movements are all those which are executed by the special activity and determination of the moving person. They are always produced by the muscles subject to our will, and are the result of the organic contractility, influenced by our will. The special effects of a local active movement are—(1) To put into activity every single muscle, or only a part of it, or a group of muscles. (2) To increase locally the afflux of arterial blood; and (3) to increase the innervation.

Passive movements may be described as being executed either by living or inanimate agents, which are alone the moving power; they are in no way connected with any special activity or determination of the person operated on. Among the special effects of local passive movements may be mentioned the following:—(1) the relief of pain; (2) moderate increase of the local nutrition; (3) variations in the venous and lymphatic flow; (4) restoration of the form, position, and direction of the parts, as well as the mobility of the articulations; (5) stimulation

of the innervation in the sensory fibres; and (6) to increase or diminish the temperature of the body, or a part of it.

Movements are natural curative agents in many diseases. Voluntary or involuntary, active or passive, they act in a most extensive manner, by preventing, allaying, curing, and suppressing disease. They effect their purpose either as derivative from the sensitive nervous parts, or as neutralising the bad effects of external injuries. In the healthy state, the brain expresses its sensations and ideas by muscular action; in disease, it does the same. During pain, or any other disagreeable sensation, it is the commonest thing in the world to see the sufferer either making a grimace, twisting his trunk, moving his limbs, or rubbing the part. Patients in delirium or mania often find relief by screaming, shouting, and other violent movements. On the other hand, we often see the sufferers relieved by voluntarily suspending muscular action, by resting the body, or part of it, in this or that position; for instance, we might contrast the elevation of an inflamed limb with the prone position of a fever patient, or with the stooping position of an asthmatic martyr.

Active movements are used therapeutically, in order—To strengthen and fortify a muscle—that is, to form new and stronger muscular fibres; to effect a better innervation of the motor nerves; to increase the temperature; to promote the formation of arterial blood in general; to derive blood, principally the arterial, from neighbouring organs; to effect an increased circulation of venous blood and lymph fluid, not only in the muscles, but also in more distant regions of the body; to relieve the contraction of certain muscles by strengthening their antagonists.

Passive movements are used therapeutically—In hypertrophy, due to congestion; for the removal of the products of inflammation; in dilatation of the veins; in disorders of the valves of the heart; for the relief of pain.

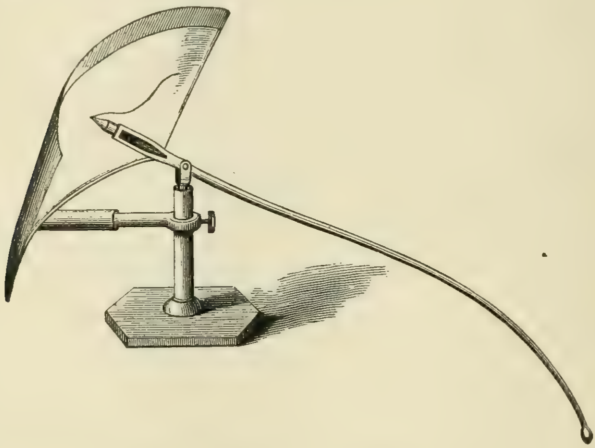
[A number of cases were here related by the writer.]

AN INSTRUMENT FOR ACCURATELY RECORDING LATERAL CURVATURE OF THE SPINE.

By R. E. Roth, M.R.C.S. Eng.

This little instrument, which I have the pleasure of bringing before your notice, I invented some time ago, in order that I might accurately record from time to time, in my case-book, the improvement that took place in scoliotic patients, who were undergoing a rational gymnastic treatment. The usual method of photographing, or making a sketch of a scoliotic before and after treatment, is always unsatisfactory, because it is so easy to minimise or enlarge the curves according to will. I take advantage of the fact, that rotation invariably accompanies lateral curvature, so that if we make a tracing, showing the differences of the back on both sides of the spinal column, we have an accurate record of the extent of the deformity. But this tracing must be made under certain conditions, otherwise we are liable to error. The patient having had her clothing removed, and fastened around the hips, just below the

trochanter, the surgeon stands behind, and corrects any irregularity of the hips by placing a suitable block, or a small book, under the foot; he then requests the patient to stoop forward, and to allow the hands to hang as much as possible. By this method, all weight is taken off the spinal column, and any curvature and rotation that is now noticed will be of a permanent character, and cannot be either increased or diminished, so long as the patient is in this position. In order to make a tracing, I place the stand of the instrument at some chosen spot on the spinal column, the chosen spot being the length of the long arm of the lever from the part which we wish to trace. Now, on holding the stand firmly down with the index and middle fingers of the left hand, and on slowly moving the ivory point at the end of the lever with the right, the short arm, which carries a pencil, makes a correct tracing on the slip of paper, held firm by a curved piece of tin. The resulting tracing, which is reversed in size, will depend on the ratio of the short to the long arm of the lever; in this instrument, the tracing made is one-fourth of the natural size.



CASE OF COMPOUND DISLOCATION OF ANKLE JOINT, WITH FRACTURE OF ASTRAGALUS *PER SE*, AND RESECTION OF SAME.

By H. C. Garde, F.R.C.S.

Surgeon to the Maryborough Hospital, Queensland.

The notes of the case which I now bring before you were taken some years back, but as the injury to the astragalus is of a rather exceptional nature, they may not be deemed unworthy of reproducing. On the 11th March, 1882, Robert P., aged 33 years, fell down the hold of a steamer (some twelve feet) landing on his feet, and which he said immediately turned under him. I saw him on the wharf, half an hour after the accident, and found him suffering from a Pott's fracture of the right foot, which was readily brought into position. On cutting off the left

boot a more serious state of affairs presented itself, viz., a laceration of about an inch in length on the inner side of the foot, through which a fractured surface of bone protruded. My colleague, the late Dr. J. J. Power, just then arriving on the scene, we decided to remove the patient to his own house before doing anything further. On arriving there chloroform was administered, with the double view of relieving pain and facilitating the reduction of the dislocated and fractured bone. On careful examination, we found we had to deal with a portion of the astragalus, which was dislocated inwards, forwards, and upwards. Every means, including enlargement of the wound, and division of the tendo Achillis, was tried to replace the bone, but without success; so that nothing remained to be done, but either to amputate, or resect. We decided on the latter, which I accordingly did, removing the body and portion of the neck, the greater part of the head of the bone remaining *in situ*. The anterior and external portion of the posterior facet on the inferior surface was also fractured, and as it could not be got at readily, was allowed to remain. The foot was then brought into position, and kept on a back splint. Listerism was not carried out, but the strictest cleanliness was observed, with the result that the wound healed in six weeks. It took a few months before he was able to get about, but since then he has continued at his work (wharf storeman), and can walk without a stick, but has a hardly perceptible limp. The chief point of interest about the case is the fact that neither of the other bones forming the joint were injured, and it is difficult to account for, how such a strong bone as the astragalus should be smashed right across, and the greater portion of the bone shot out of its place without more or less injury to the other bones which articulate with it.

[Dr. Garde exhibited the specimen, which is a most interesting one.]

A CASE OF LORETA'S OPERATION FOR DILATATION OF THE PYLORIC ORIFICE OF THE STOMACH.

By WM. GARDNER, M.D., C.M. Glas.

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The following case is recorded, not because I deem it to be of any value as an isolated instance of success, but because it is the first published example in the Australian colonies of a procedure highly recommended in similar conditions by Professor Loreta, of Bologna, who performed his first operation in September 1882. A full account of this was published in the *British Medical Journal*, Feb. 21st, 1885, by Mr. Holmes. On April 26th, 1884, a short account of Professor Loreta's ninth operation, which was for contraction of the cardiac orifice, is given. The operation has also been practised by a few other Italian surgeons, and in two cases by McBurney, of New York, notes of which are to be found in the *New York Medical Journal*, of Jan. 16, 1886. So far as I know, the remote results of these operations have not yet been published, and the value of the operation is still *sub judice*. The immediate results of the published cases have been excellent The operation is suitable for cases of simple cicatricial or fibrous narrowing of the pylorus, or the cardia or lower end of the œsophagus. The

narrowing in simple cases is due to hypertrophy of the involuntary muscular fibre, and over-distension of this is the object to be aimed at, and the result is said to be as good as in cases of over-distension for fibrous stricture of the rectum.

Reasoning from analogy, every surgeon would be disposed to say that the good result will only be a temporary one, as is certainly the case in all true strictures of the urethra. This is the great point which has yet to be settled, and I offer my first case as an encouragement to others to perform the operation, and note carefully the immediate and also the remote result. In this way, and in this way only, can the permanent value of the procedure be estimated.

The patient upon whom I operated was sent to me by my friend Dr. Baly, of Yorketown, with a note, stating that she had long suffered from pyloric obstruction, and that he considered the case a suitable one for trying Loreta's operation. Every form of treatment had been tried by him for months, and after consultation with my colleagues, I determined to make the attempt, and as the evident thickening of the pylorus might turn out to be malignant, I made every preparation for performing pylorectomy, should it be deemed necessary. For the same reason, I made use of a transverse incision, such as Billroth recommends for pylorectomy, and I found this quite convenient for the other operation. The following is the case :—

J. H., aged 43, admitted to Adelaide Hospital July 15, 1888.

History.—Patient complains of sickness, and pains in the region of her stomach. When she takes anything, it usually lies on her stomach, and makes her feel very sick. She has been troubled with indigestion, off and on, for several years, but during the last three months it has got very much worse, and patient finds her strength failing. As a rule, she vomits every other day, and generally in the evening. Sometimes, however, she goes for four or five days without being sick, and then vomits up over a chamberful. The pains across the upper part of her abdomen are of a shooting character, and made their appearance about three months ago. They are very much worse just before vomiting, on account of the distension of the stomach with gas, which has then occurred. The pains increase in proportion to the amount of flatulence present. Previous health has been good, as is also the family history. Has been married twenty-four years, and has had nine children, the youngest of which is five years old. Climactery three years ago.

Present Condition.—The stomach is of variable size, but distinctly enlarged, and on some days its outline can be traced on the abdominal walls. To the right of the median line, and just above the umbilicus, may be felt a lump about the size of a walnut, which moves up and down with the movements of respiration. The vomited matter is of a yeasty character, very acid, and contains sarcinæ in abundance. Urine is acid, and contains neither sugar or albumen. Professor Rennie kindly examined the vomited matters, and reports just a trace of free hydrochloric acid.

July 19th.—Complains of a boring pain in her stomach.

July 26th.—Patient anæsthetised, and stomach washed out with two pints of weak boracic lotion.

July 30th.—Patient anæsthetised, and stomach washed out with five pints of the lotion. The tumour could be felt readily on each of these occasions.

Aug. 4th.—Patient has been on milk diet, and has not been sick since first washed out. To have milk, baked apples, &c.

Aug. 6th.—Patient sick this evening and last night.

Aug. 7th.—Patient vomited again this evening.

Aug. 11th.—Patient partially anæsthetised, and stomach washed out.

The Operation.—On the 12th August, 1888, the patient having been placed under the influence of ether, Dr. Gardner performed the following operation :—(The stomach was thoroughly washed out with a boric acid solution). A transverse incision, about four inches long, was made in the epigastric region, and the skin, muscles, and fascia, down to the peritoneum, were rapidly divided. All bleeding points were ligatured with wallaby tendons, and the application of hot sponges for a few minutes effectually stopped the oozing, before the peritoneum was opened. Although no tumour could be recognised in the neighbourhood of the pylorus, the walls of that part of the stomach were very hard, and greatly thickened. A portion of the viscus was then drawn out through the opening in the abdominal parietes without difficulty, as no adhesions were present. After the extruded part had been carefully surrounded with hot sponges, an opening one inch long, running in the long axis of the organ, was made with scissors, through which the operator inserted the forefinger of his right hand. On examining the pyloric orifice, he found it almost completely closed, and it was with some difficulty that a No. 6 gum elastic male catheter was made to pass through it. After patiently boring with the right forefinger, the passage was gradually opened up, the forefinger eventually being passed with ease from the stomach into the duodenum. The hæmorrhage was very slight indeed, and the interior of the stomach having been cleansed immediately before the operation, no difficulty was experienced with the stomach contents. The wound in the gastric wall was brought together with great accuracy, and in a most satisfactory manner, by means of Gussenbauer's sutures, which were introduced with specially curved needles, and an interval of about two millimetres allowed between each. Fine silk was employed. All the stitches were placed in position before any were tied. The wound in abdominal wall closed in the usual manner.

Aug. 12th, evening.—Patient complaining of pain since the operation. No vomiting. Enemata of milk, ℥ijss, and brandy, ℥ss, every eight hours. Enemata of port wine every eight hours, ℥iij. ℞. Strychninæ, gr. $\frac{4}{5}$; glycerine, ʒij; aquam ad., ℥ij. Fifteen drops ($\frac{1}{80}$ gr.) hypodermically every four hours.

Aug. 13th.—Patient slept very little during the night. Wind troublesome. Passed urine at 2 a.m., $10\frac{1}{2}$ ozs. Temperature, 100°; pulse, 125. Enema of soap and water. No vomiting.

Aug. 14th.—Patient slept well during the night. Passed flatus per rectum, and found great relief. No vomiting.

Aug. 15th.—Bowels not open ; has passed flatus. There is no abdominal distension, but complains still of flatulence. There is some pain in her stomach.

Aug. 16th.—Very restless during the night; still complains of flatulence. No vomiting. Gruel, a teaspoonful every two hours.

Aug. 17th.—Slept very little during night ; still passing flatus per rectum, causing pain. No vomiting after giving gruel. One stitch

removed. 6.15 p.m.—Patient comfortable. Supp. morph. gr. $\frac{1}{4}$; mitte iij, one every six hours. Enemata of brandy and milk.

Aug. 18th.—Complains of very little pain; still much flatus passing per rectum. Bowels moved at 3.30 p.m. No vomiting. One teaspoonful of scraped rump steak every four hours. Give ten drops of ac. hydrochlor. dil. quarter of an hour before, and then gr. iij of pepsin immediately after. A teaspoonful of milk, and two teaspoonfuls of lime water, every four hours, alternately with the beef. Enemata of milk every four hours. Injection of strychnina, twice daily, gr. $\frac{1}{80}$.

Aug. 19th.—Wounds dressed. A little discharge. Stitches removed.

Aug. 20th.—Wound dressed. Looking well. There is a little inflammatory hardening about the wound. Enema of soap and water, and bowels moved well.

Aug. 21st.—Omit raw meat. Give chops and fish instead, and also bread and butter. Enemata every six hours only.

Aug. 22nd.—No vomiting. Complains of pain in her right side.

Aug. 24th.—There is a little discharge from the centre of the wound. ℞. Liq. strych. m. iij, aq. ad. ʒj, thrice daily before food.

Aug. 28th.—The edges of wound are uniting fairly well. The skin is a little inverted at the edge. Still inflammatory hardening about the wound.

Aug. 29th.—Patient complains of pain in her stomach. No vomiting. Food does not cause her trouble.

Aug. 30th.—Still has crampy pains in her stomach at night; relieved last night by some warm water and brandy. Scarcely any discharge from the wounds.

Sept. 7th.—Patient says that she feels fine; never feels sick, but nearly every night she has pains of a burning character about her stomach. She eats bread and butter, eggs, toast, cake, mutton, beef, custard, and drinks milk and cocoa. She does not take pudding, vegetables, or tea.

The temperature rose above 100° on only one occasion.

For the short notes of the case, I am indebted to my dresser, Mr. Verco; and the account of the operation was written for me by Dr. Giles, who assisted.

On Dec. 24th, 1888, Dr. Baly, at my request, kindly sent me the following note, after examining the patient:—

"Patient looks and feels perfectly well, and has evidently gained flesh in a marked degree; weight 7st 10lb (weight before operation not known, but Mrs. Hewton thinks she must have gained a stone). Has never vomited since the operation, and has had no pain since leaving the hospital. Is able to eat ordinary diet without inconvenience, but has felt somewhat uneasy after eating beef, cabbage, or rich cake. Can eat mutton, poultry, fish, and farinaceous puddings, and drinks tea three or four times a week. No flatulence, heartburn, or eructations now after food; bowels regular. Ate green peas several times during the season without any bad effects. Examination :—Abdomen well covered (instead of appearing a mere envelope of skin, as it did before operation); skin over site of operation freely movable; some induration still to be felt in the region of the pylorus. Gastric resonance not increased upwards, or to the left." He adds, "you will recollect, of course, that before the operation, even a little milk used to cause Mrs. H. great agony."

I have quoted Dr. Baly's words, although not intended by him for publication, as I am anxious not to interpolate in this account any bias of my own in favour of the operation. In conclusion, I must say that in my opinion this case warrants me in recommending those of you, who have the chance, to give the operation a fair trial, and publish your results both immediate and remote, for only in this way can we arrive at a satisfactory conclusion.

THE SURGERY OF THE KIDNEY.

By William Gardner, M.D., C.M. Glas.

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The surgery of the kidney is one of the greatest developments of modern surgery, and dates from 1869, when Simon, of Heidelberg, performed extirpation of the kidney with the object of curing a urinary fistula. The case was a complete success, and six months after, the patient was in perfect health. In 1690, Blancard suggested that extirpation of the kidney might be attended with a successful result in cases of renal calculus. In the earlier part of this century, the kidney was several times removed successfully in animals, and accidentally in man, by Wolcott (1861), Spiegelberg (1867), Peaslee (1868), and Spencer Wells. In 1870, Thomas Smith, Surgeon to St. Bartholomew's Hospital, wrote an article in the "Medico-Chirurgical Transactions," recommending nephrotomy as a means of treating renal calculus; and this operation was performed, for other conditions, successfully in 1870 by Durham, Moses, Gunn, and Bryant. Nephro-lithotomy was first performed by Mr. Henry Morris in 1880. Nephrorraphy was first performed by Professor Hahn, of Berlin, in 1881, and since then he has repeated the operation several times, and always with success.

My own operations on the kidney began with a case of nephrotomy for scrofulous abscess, performed on May 16th, 1883, in the Adelaide Hospital; and although the patient only lived a month afterwards, he experienced great relief, but eventually died of uræmic convulsions. At the post-mortem, it was found that both kidneys were diseased, the right (the one operated on) being in a more advanced stage of disease than the left. Nephrectomy was first performed by me in October 1885, upon a patient who, in February 1884, had an abscess of the right kidney opened and drained by nephrotomy. The operation was necessitated by the persistence of a urinary fistula in the right loin. Langenbuch's abdominal incision was used to ascertain the state of the other kidney, and as it was found not greatly enlarged, the right kidney was removed by a lumbar incision, and the abdominal wound closed in the ordinary way. Suppression of urine caused death in forty-eight hours; and at the post-mortem there were no signs of peritonitis, but the left kidney was found to be in a state of fatty degeneration. On Dec. 4, 1884, I operated on a case of movable kidney, which had given rise to troublesome symptoms, fixing the kidney to the sides of the lumbar incision by two kangaroo tendons passed through the substance of the kidney. The result was completely successful, and she has remained in splendid health, and free from all her previous troubles to date. Nephro-lithotomy was first performed by me on Feb. 10th, 1887,

for calculus, and in a fortnight the patient returned to his home, and in a short time was able to resume his work as a lumper on the wharf; and a few days ago, I learnt from his father that he had never had a day's illness since.

Appended to this paper is a table of all the operations on the kidney which I have performed, and also detailed accounts of several of the more interesting cases. They include three cases of nephro-lithotomy for renal calculi; No. 7, in which a stone weighing twenty-five grains was removed from a healthy kidney. The patient had been suffering severely for three years, and within a month was able to return to his work as a lumper on the wharf. No. 13 was operated upon by Terrier's transperitoneal method, because the kidney was enlarged and contained fluid. The cause was not diagnosed until the kidney was incised, and then a small fragment of calculous matter was accidentally felt and removed from the inner wall. A further search led to the opening up of a calyx, and the removal of an irregularly-shaped calculus, weighing ninety-six grains, from which the former had become detached, the line of fracture being distinct, and the fragment afterwards fitted on accurately. In this case, the sacculated kidney was not removed, but drained by a glass drainage-tube, and the result was perfect, the wound healing up without leaving any fistula. No. 14 was diagnosed as a case of stone in the right kidney, and at the operation the organ was found so irretrievably damaged, that it was removed by nephrectomy; and this course of action was taken because pyo-nephrosis was found.

We have thus examples of three different conditions :—

(1) A calculus removed from a sound kidney, with preservation of the organ, and without the formation of a urinary fistula.

(2) Removal of a calculus from a hydro-nephrotic kidney, with retention of the damaged organ, and cure without the formation of a urinary fistula.

(3) Removal of a calculus from the kidney, which was irretrievably damaged and contained pus, and was, therefore, removed at the same time.

The first case is undoubtedly the best, as the healthy organ was retained, and when contrasted with the others, shows the immense advantage of an early operation. On the other hand, there is an advantage in diminished risk in operating on cases complicated by hydro- or pyo-nephrosis, because the other kidney, during the process of destruction of the one, has been gradually educated up to do extra duty; and so the risk of suppression of urine is lessened, much in the same way that gangrene is less frequent after ligature of the femoral for aneurism, when pressure has previously been tried, than when it has been performed without such previous treatment. The cases also show that the remains of the kidney may be left behind when the contents are serous, but that it is probably the best practice to remove the damaged organ when pyo-nephrosis is present.

Nos. 4 and 9 in the table exhibit the great advantages to be derived from nephrorraphy in suitable cases. Both cases were absolutely restored to health. In conclusion, let me say that I have not ventured on the debatable ground of diagnosis, but have endeavoured to lay before you, as shortly as possible, my own work; and I trust that it will be found not to be without some interest to the members of this Congress.

Case.	Name.	Date.	Disease.	Operation.	Remarks.
1	J. S.	1883 May 16	Scrofulous kidney	Nephrotomy and drainage	On June 18th, 1883, uræmic convulsions set in, and patient died on the 19th. Post-mortem, both kidneys were found to be tuberculous, but the right was in a more advanced state than the left.
2	A. McL.	1884 Feb. 29	Scrofulous kidney	Nephrotomy and drainage	On May 14th, 1884, he was made an out-patient, with a lumbar sinus, discharging a small quantity of thin pus.
3	A. McL.	1885 Oct. 6	Scrofulous kidney	Nephrectomy	Was able to work from the above date till April, 1885. On October 6th, as he was losing ground, nephrectomy was done by lumbar incision—an abdominal incision having first been made to ascertain that the left kidney was not enlarged. Death occurred in 48 hours, from suppression of urine; and fatty degeneration was found, post-mortem, in the left kidney.
4	Mrs. G.	1884 Dec. 4	Movable kidney	Nephrorraphy	Fixed with two kangaroo tendon ligatures, and has remained absolutely fixed since, the patient having got rid of all her troublesome symptoms, and having become fat and strong. She remained well to date (December 1888).
5	F. K.	1885 Feb. 10	Scrofulous kidney	Aspiration	Four punctures made, and nothing but blood withdrawn. This was probably malignant, and secondary nodules appeared in the liver, but no post-mortem could be obtained.
6	Mr. W.	1886 Oct. 2	Tuberculous kidney	Nephrotomy	This was a case of advanced tuberculous disease of the lungs, but as the large collection of pus in the kidney caused great pain, it was deemed advisable to open and drain. It gave great relief, and he died some weeks after from exhaustion. The kidney only was examined, and a huge abscess was found.
7	Mr. D.	1887 Feb. 10	Calculus in kidney	Nephro-lithotomy, lumbar	Stone weighing 25 grs. was removed from a healthy kidney, no suppuration or sacculation of the kidney had occurred. Up to date (1888) patient has been able to continue hard work as a lumper on the wharf.
8	E. K.	1887 Feb. 17	Necrosis of transverse process, lumbar vertebra	Lumbar incision	An old sinus in the left lumbar region was explored by the usual lumbar incision for nephrotomy; the kidney found healthy, and the transverse process of a lumbar process, which was found to be necrotic, was removed. Recovery was complete.
9	Mrs. P.	1887 Aug. 11	Movable kidney	Nephrorraphy	The kidney was fixed by two kangaroo tendon ligatures. Complete relief of gastric and other symptoms followed, and patient continues well to date.
10	G. P.	1886 Oct. 18	Supposed calculus	Nephrectomy	At a consultation, it was decided that the presence of a stone in the left kidney was almost certain, and in the efforts to examine the kidney thoroughly, it was lacerated, and was then removed. The patient made an excellent recovery, but no stone was found. This is the only case in which I have failed to find a stone after diagnosing one.
11	A. L.	1887 Dec. 16	Hydatid of kidney	Abdominal section	Langenbuch's incision outside of right rectus. Cyst growing from the outer side of the capsule of the kidney; incised, and sides of the cyst fixed to the abdominal wound, all the membranes being removed at the same time. Complete recovery.
12	Mrs. D.	1888 March 30	Hydro-nephrosis	Aspiration	Four ounces of fluid removed, without any odour of urine, and yielding only faint traces of urea.
13	Mrs. D.	1888 April 18	Hydro-nephrosis and calculus	Nephrotomy, with removal of a calculus	Terrier's trans-peritoneal incision adopted, and a calculus weighing 96 grs. removed from one of the calyces of a dilated kidney; drainage from the front, and complete healing by the end of April. This patient succumbed to cancer of the pylorus within six months.
14	Miss M.	1888 July 28	Calculus	Nephrectomy	The kidney was completely sacculated and almost unrecognisable, and was removed with the stone by lumbar incision. Complete recovery.

X 2

Treatment of Kidney Disease.

Case I.

John Smith, æt. 28, seaman; tuberculosis of kidneys, nephrotomy, death.

April 13, 1883.—Aspirated in right renal region by Dr. Verco, and two ounces of fœtid pus drawn off.

May 5.—Transferred to surgical wards under Dr. Gardner's care.

May 16.—Has a high evening temperature; passes three pints urine in twenty-four hours, which contains pus. At 4 p.m., under ether, and using the carbolic spray, Dr. Gardner made an incision down and into the right kidney, evacuating from six to eight ounces fœtid pus. The kidney was freely explored by the finger; no stone found. A large tube inserted, and gauze dressing applied.

May 17.—Temperature normal; feels better, and sits up in bed with ease; moves more freely than before operation; on dressing, very little discharge found.

May 18.—Dressed; urine dark olive colour, and contains albumen.

May 20.—Dressed; discharge oozing through bandages; some pus in urine; bowels confined.

May 21.—Temperature rising every night; urine over three pints, no pus; feels well.

May 25.—Dressed; gut sutures dissolving; tube removed; urine clear, four pints per diem.

June 11.—Discharge increasing the last week; patient much weaker, and at times delirious; urine clear; bowels rather loose; takes nourishment well; an epileptiform attack to-day.

June 16.—Urine ruby red colour; contains blood.

June 17.—Worse; passes evacuations involuntarily.

June 18.—Two "fits" last night, one this morning.

June 19.—Died, having had several more "fits."

On post-mortem examination, both kidneys were found to be scrofulous, and have been exhibited to the Society.

Cases II. and III.

Alexander M'Leod, æt. 42, gaoler; abscess of kidney, nephrotomy, recovery.

January 21, 1884.—Five years ago, experienced a scalding sensation on passing urine, and this continued for about six months, when it was so bad as to necessitate micturition every hour; medical treatment for six months, without much benefit. For two years subsequently had scalding, but not such frequent micturition. Two and a half years ago passed blood with the urine, and had, at intervals of about a month, colic attended by vomiting, and pain in the hypogastric region. This lasted about two months. Has since been pretty well, until within two months ago, when pain set in in the right lumbar region. No scalding for about twelve months; apparent fulness of right lumbar region, with dulness on percussion in front; no kidney margin to be made out; complains of pain on manipulation in both lumbar regions, but especially the right.

January 22.—Urine slighty acid and copious; contains phosphates, and much pus.

January 24.—Gets up once every night to micturate, and passes water three times during the day; has occasional lumbar pain passing down the right thigh.

January 26.—Urine deposits less; no albumen; slight trace of phosphates.

January 28.—Dulness of right back, with absence of vocal resonance and vocal fremitus; pleurisy with effusion. Transferred to Dr. Verco's care.

February 24.—Sent back from medical wards, fluid having become absorbed under treatment.

February 29.—Under ether, and using a carbolic spray, an incision was made into the kidney, and one and a half pints of thin pus evacuated.

March 1.—Dressed; very little discharge.

March 5.—Dressed; less discharge.

Two weeks after leaving the hospital, the patient returned to his duties as gaoler, and was able to continue his work to the end of April 1885, when he began to lose flesh, and on the 18th May was re-admitted into the Adelaide Hospital. He has lost five pounds in weight during the last month. There is still a sinus in the loin, from which pus escapes, and a probe can be passed along it to the depth of three inches. The urine is acid, slightly turbid, and contains no albumen. The average daily amount for a week was 50 ozs.

June 4.—Professor Rennie kindly estimated for me the quantity of urea daily excreted, and found it to be 400 grains.

June 5.—After a consultation with my colleagues, I determined to attempt removal of the kidney, a procedure which was rendered necessary by the downward tendency of the case. The patient having been put under the influence of ether, I made an incision obliquely from the twelfth rib to the crest of the ilium in the right lumbar region, keeping as nearly as possible in the line of the old cicatrix. The edges of the wound being held aside by retractors, I continued to cut down to a depth of three inches, and on thrusting in my finger, I felt three openings leading out laterally, which appeared to be the calyces of a dilated pelvis. I then came to the conclusion that the kidney was so incorporated with the surrounding structures, that it could not possibly be removed. A large drainage tube was inserted, and the wound closed with metallic sutures. The subsequent progress of the case was uniformly favourable, there being no rise of temperature at any time, and the patient was discharged on the 28th July in much the same condition as when admitted to the wards.

October 3.—Patient came to my consulting rooms, and besought me to do something for him to relieve his present condition, as he felt himself sinking gradually. He elected to enter a private hospital, and I determined to make another attempt to remove the kidney.

October 6.—Assisted by Dr. Giles, Dr. Moore giving ether, I made an incision to the outer side of the right rectus (Langenbuch's) four inches long, and divided the tissues down to the peritoneum, which I carefully opened, and divided to the full extent of the external incision. I then gently passed my hand into the abdominal cavity, and felt the right kidney considerably enlarged, but still movable, and therefore not, as I had imagined, incorporated with the surrounding tissues. Passing

my hand cautiously across to the other side, I examined the left kidney, and it felt to me about the usual size. I then determined to remove the right kidney through the lumbar incisions, if possible. Napkins dipped in warm carbolic lotion were laid over the abdominal wound, which was kept thoroughly closed by Dr. Giles. I then cut down in the lumbar region through my previous incision, until I felt the kidney, which was very much enlarged, but freely movable. As there was not room to pass in my whole hand, I made an incision along the whole length of the twelfth rib on the right side, separated the peritoneum, divided the rib with the bone forceps at its spinal end, and removed it. I then easily introduced my hand, and grasped the kidney, which was extremely brittle, and dilated to a shell. A great deal of the kidney structure broke down under the finger, but by gently pulling, I was enabled to get the pedicle so far out as to transfix with a double ligature, and tie in two portions. The cavity was then washed out with tepid water, and the peritoneum found to be intact, as the water soon began to overflow. A large drainage tube was inserted, and the wound brought together with metallic sutures. The abdominal wound was now closed with silk sutures. Lister's antiseptic dressing was employed. The whole operation lasted one hour and a half. On the morning of the operation, the temperature stood at 100·4° F., and immediately after the operation, it fell to normal, and continued so during the further progress of the case.

October 7.—Slight vomiting through the night; profuse perspirations; passed seven ounces of high-coloured urine. At 10 a.m. the wound was dressed. Beef tea and brandy enemata were ordered every two hours. No sickness during the afternoon. Slept at intervals. At 6.30 p.m. patient became very restless, and vomited. The catheter was passed twice during the day, but no urine was found in the bladder.

October 8th.—No urine passed, and vomiting continued at intervals until death, which took place at 2.30 p.m.

Post-mortem Examination.—Body much emaciated, skin jaundiced, abdomen distended. In the anterior abdominal wall, three inches to the right of the linea alba, is a longitudinal wound brought together with silk sutures. The skin in the neighbourhood of the wound is somewhat dark and discoloured. Over the right kidney, in the lumbar region, is a wound extending from a point just above the twelfth rib, downwards for nearly six inches. Running from this, in the direction of the rib, is another incision, about four inches long. Through this, three inches of the twelfth rib have been removed. On opening the abdomen, some flakes of lymph were observed on the intestines. One recent adhesion exists between the wound and the ascending colon; and between the lower lobe of the liver and the intestines adjoining, are several bands, also quite recent. Very extensive old fibrous adhesions are found between the ascending colon and the posterior abdominal wall. The abdominal cavity contains about six ounces of thin watery fluid. The inner surface of the wound in the anterior wall looks healthy, but all the sutures have torn through the peritoneum, and a gap of nearly one inch is seen between the divided portions, showing some tension has existed. The intestines are enormously distended, but not matted together, and appear quite healthy. No trace of tubercle in any of the mesenteric glands. Right kidney

absent. A large cavity capable of admitting a man's two fists, enclosed by thick fibrous walls, and completely shut off from the peritoneal sac, communicates with the wound in the right lumbar region. It contains a few pieces of broken down kidney substance, and small blood clots. The pedicle of the kidney is also found here, firmly tied with a double silk ligature. Left kidney is enlarged, pale, soft and flabby; the capsule readily strips off; the cortex is somewhat wasted and yellow. Distinct signs of fatty degeneration are present in this organ. The right ureter is embedded throughout its entire length in dense hard fibrous tissues, forming a thick band which is firmly adherent to the underlying muscles. A probe passes down it with ease. There is no trace of dilatation. The left ureter is normal. The bladder is small and contracted. About a teaspoonful of thick pus escapes on opening. The walls are a quarter of an inch in thickness. The mucous membrane is corrugated and hypertrophied. The prostate appears healthy, normal in size, and shows no sign of any tubercle.

A Case of Nephrotomy.

January 22, 1884.—Mrs. N. consulted me; married twelve years; two children living; nine have died; the children living are the fifth and the first; took ill three years ago after confinement; micturition became painful, and white sand came away in large quantities; the urine became turbid and smelt badly; pain began in the right lumbar region, and passing across the abdomen ran into the right labium. When the pain in the back was worst, vomiting was present, often lasting twenty-four hours; the attacks have occurred as often as three times in a week. Examination per vaginam showed endo-cervicitis and abrasion of the os, with rents in the cervix; on sounding the bladder, it was found to be covered all over with phosphatic concretions. I sponged out the uterus with glycer. acid. carbol., inserted a watch-spring pessary to secure rest, and washed out the bladder twice a week. This treatment was so far successful, that after a time I lost sight of her.

In July 1884, she appeared again, and I then found that, although the bladder was entirely free from phosphatic plates, the right kidney had become very much enlarged, and could easily be felt. I then determined to explore the kidney.

On August 4 and 6, with the assistance of Dr. C. Gosse, Dr. Corbin giving ether, I performed nephrotomy. After opening the capsule of the kidney, which I stitched on both sides to the edges of the wound, I made an incision into the kidney, examined carefully with the finger, but could find no stone. A large drainage tube was then inserted, and the wound dressed with carbolised gauze. The spray was allowed to play freely over the part, but was not directed on to the wound.

August 7.—Dressed the wound, which was apparently healed throughout its whole length; urine passed the last twenty-four hours feebly acid, quite clear; sp. gr. 1022; patient vomiting a greenish fluid.

August 8.—Urine greenish; sickness stopped; dressing stained with a considerable sanguineous discharge. Urine, when tested with nitric acid, turns black; sp. gr. 1022.

August 9.—One-fifth curdy pus in the urine; sp. gr. 1022.

August 11.—Urine clearer, one-sixteenth pus only.

August 13.—Sits up; takes food well; urine contains one-thirtieth pus only; tube discharging well.

August 17.—Tube washed out twice daily with weak Condy and water; urine slightly cloudy with pus.

August 19.—Introduced sound into bladder; no stone; rather more pus in urine.

August 23.—Urine contains very little pus; patient putting on flesh, and walks about.

September 2.—Patient left private hospital quite strong; urine clear; wound discharging very little. After returning home, patient had in some way caught cold, and had severe rigors and profuse sweats for many days.

A Case of Nephrotomy.

August 23, 1884.—Mrs. K. consulted me, with a history of gravel for years, and pus in the urine. She complains of intense pain for months in the region of the left kidney, but as she was very fat, no enlargement of the organ could be made out. Her intelligence was not of the highest order, and I desired her to bring me a sample of the matter she passed. In a few days she brought me an eight-ounce bottle full of muco-pus. I then determined to explore the kidney, and with the assistance of Dr. Jay, who gave ether, I performed the usual operation for nephrotomy. The kidney was plainly seen at the bottom of a deep pit, caused by excessive deposit of fat, and after fixing its capsule, I cut into the substance, and explored the interior, but found nothing abnormal. The wound was dressed in the usual way, and a drainage tube inserted. Healing went on rapidly, and in a few days the drainage tube was removed. She left the private hospital on September 17th, well. In conversation with her on the day after the operation, I discovered that she had made up the bottle of pus, by pouring off the clear urine every day, and storing up the muco-pus.

Case IV.—Nephrorraphy.

Mrs. G., æt. 45, consulted me on the 6th September, 1884, for excruciating pain under the ribs on the right side, and below the right shoulder blade. Has eleven children, youngest three years of age. She showed me a lump on the right side of the abdomen, which could be freely moved about, either downwards to level of iliac crest, laterally beyond the median line, and backwards it could be displaced so as to be lost under the edge of the liver. It was perfectly smooth on the surface, and about the size of an ordinary kidney. I diagnosed "movable kidney," and told the patient's husband, that if at any time they could assure me that the pain was unbearable, I would cut into the loin and stitch the kidney to the edges of the incision.

In the beginning of December she returned to say that she could bear the pain no longer.

Accordingly, on 4th December, with the assistance of Drs. Way and Gosse (Dr. Graham, of Melbourne, being present), I cut down by the usual incision in the loin, I then opened the capsule, and put in two steadying stitches, which I passed through the sides of the incision. Finally, I passed two chromicised kangaroo tendons through the substance of the kidney, and about two inches apart; then passing an

unthreaded needle down through the incision on each side, I drew out the kangaroo ligatures and tied them tightly, after inserting a drainage tube in the lower angle of the wound. The operation was done under thymol spray (1 in 1000), and dressed with thymol gauze. The progress of the case was very slow, owing to the formation of a burrowing abscess under the fascia, necessitating incision and the insertion of a drainage tube. The collection of matter could be distinctly felt just inside of the anterior superior spinous process of the ilium. This abscess was probably caused by the decomposition of blood which had forced its way down under the fascia.

The final result of this case was excellent, the patient being now entirely free from her old pains, and able to walk about with comfort. The kidney can be felt obscurely in its normal position, and does not undergo the slightest change of position during the movements of the patient.

Case VII.—Nephro-Lithotomy.

Daniel D., æt. 23, consulted me first on January 29, 1887, complaining of pain in the left lumbar region, from which he has suffered for the last three years. Whenever he walks or runs, the urine becomes like blood; and on passing it, he has pain across the lower part of the abdomen. When the pain is very severe, he has to make water frequently, and sometimes there is a difficulty in starting the stream. Three years ago last November, was working at a dam with an excavator, and while running across it he fell down on his left side, and twenty minutes after, on attempting to make water, he passed pure blood. This continued for a month. Has never been able to do a hard day's work since, without feeling the pain. In every severe attack, has had pain in the left testicle. Family history good; previous health good. Has not suffered from any venereal disease. Heart and lungs normal; sounded, no stone or stricture. There is undoubted tenderness over the left kidney, detected by bi-manual palpation. Microscopical examination of the urine showed pus and blood-corpuscles, and abundant crystals of oxalate of lime. After a careful consideration of the case, the diagnosis made was probable oxalate of lime calculus in the left kidney.

On the 10th February, the patient was placed under the influence of ether by Dr. Lloyd, and a transverse incision was made in the left lumbar region, about four inches long, and three-quarters of an inch below the twelfth rib. The dissection was continued downwards, through the muscles and the lumbar aponeurosis, and the quadratus lumborum was divided for one inch. The bleeding was controlled by the application of pressure forceps, and the separation of the supra-renal fat and capsule of the kidney was made by tearing with the two fore-fingers. The kidney could then be plainly felt and seen, and a fine trocar was thrust into it, and gave the peculiar grating feeling caused by striking calculous matter. The kidney was then incised till the point of the trocar was reached, and then a small stone was felt, resting in one of the calyces below the incision. By means of the left fore-finger in the wound, and a small pair of lithotomy forceps passed into the kidney by the right hand, the stone was delivered. The wound was then douched out with warm thymol solution, and two large drainage tubes

inserted into the post-renal cavity, and the edges brought together with interrupted sutures of silver wire and wallaby tendon alternately. The stone weighed twenty-five grains, and consisted of oxalate of lime.

February 10, 7 p.m.—Rallied well after the ether, temperature 98°, vomited twice, some pain in the back, pulse very good. 9.30 p.m.—Passed O ss. of urine, mixed with much blood. 12 p.m.—Temperature 101·2°. 12.30 p.m.—No sleep, restless, and in some pain; slight discharge showing at lower part of the dressing; salicylic wool applied.

February 11, 9 a.m.—Pulse 88, respiration 20, temperature 99·6°; air-bed ordered; dressed; no blood in the tubes. 6 p.m.—Temperature 100°. 8 p.m.—Sleeping soundly; discharge has not come through dressings.

February 12.—Slept fairly well through the night; pulse 88, temperature 99·6°; dressed, wound quite sweet, and urine not so highly coloured with blood. 5 p.m.—Urine not passed since 4 a.m., drawn off (twelve ounces) with catheter, previously washed in thymol. Dressed, shortened tubes a quarter of an inch, two stitches removed. The tubes after this were gradually shortened, and the wound was regularly kept clean with thymol solution.

February 16.—Anterior half of wound well united; allowed solid food.

February 17.—Bowels acted.

February 18.—One of the tubes removed.

February 21.—Second tube was removed; no urine was passing by the lumbar wound; dressed with red lotion.

This case is remarkable, as being the first reported case of nephrolithotomy in Australia.

Case XIII.—Nephro-Lithotomy by Terrier's Trans-Peritoneal Operation.

Mrs. D., æt. about 55 years, had been several times under my care, from November 10, 1886, for slight attacks of dyspepsia. Examination of the abdomen and of the chest revealed nothing abnormal, and the urine was also found to be normal. On March 6, 1888, another attack occurred, which was not relieved by medical treatment; and another examination of the abdomen was made, with the result of finding an enlargement of the left kidney. On March 29, I called Dr. Verco in consultation, and we concluded that there were symptoms pointing to a collection of fluid in or around the left kidney. We advised aspiration, which was carried out on March 30, and four ounces of light amber-coloured fluid were removed, without any odour of urine. With nitrate of silver, the fluid yielded a copious white precipitate; microscopically, there were no signs of hydatid. Professor Rennie, by chemical analysis, could only find traces of urea. We were thus left in doubt whether the case was one of hydatid or hydro-nephrosis. After the operation, the kidney swelling disappeared; three weeks after, it enlarged again; and with the assistance of Dr. Verco (Dr. Giles administering ether), on April 18, 1888, the abdomen was opened by Langenbuch's incision, outside of the left rectus, and the parietal peritoneum was stitched to the edges of the wound. The visceral peritoneum was then divided, and also stitched to the edges of the wound. The cystic swelling was then incised sufficiently to admit the forefinger, and on introducing it,

I could feel a small piece of calculous matter about the size of a split pea. This I removed, and on examining still further, I found a small fragment also embedded in what I had then discovered to be the renal tissue. I tried to remove it with the nail, but found that on scratching the tissue, the stone appeared to become larger; and inserting a knife along the finger, I incised a calyx, and removed an irregularly-shaped calculus weighing ninety-six grains. There had been a doubtful history of an attack of renal colic, but it was certainly on the opposite side. A glass drainage-tube was inserted, and the wound dressed with gauze and salicylic wool. The highest temperatures recorded were 99·2° on the second day, and 99·6° on the third day; on every other occasion the temperature was normal. Urine was passed spontaneously on the day of operation, and the patient only vomited once after the ether.

Case XIV.—Nephrectomy for Stone in the Kidney.

Miss M. has been under my care for years—first for disease of the hip-joint, which I excised on May 1st, 1881. She recovered perfectly, and enjoyed fair health for a few years, when symptoms of irritability of the bladder came on (April 1885), and this viscus was examined with a negative result. Later on (two years ago) she had an attack of renal colic, and passed a small calculus per urethram. The patient was not able to say from which side the pain started, and I was therefore unable to say from which kidney the stone had descended. For the last year, she has been passing considerable, although varying, quantities of pus in the urine. There was no enlargement of either kidney; but as there was a possibility of the presence of "strumous" kidney, and as the patient was disinclined to have any exploratory incision, I determined to await the further development of the case. Lately, she sent word to me that the pain had now declared itself in the right loin, and that she had decided to enter the private hospital for operation. On examination after admission, I discovered that the right kidney was enlarged, and the probability of stone being present decided me to operate.

On July 28, 1888, Dr. Todd having put the patient under the influence of ether, I made the usual lumbar incision, and after exposing the capsule, I passed in a needle, and immediately felt the sensation of a stone. The kidney was then incised, and exit given to a large quantity of opalescent fluid, with curdy flakes in it. After this no kidney could be felt, but a thickened condition of the outer wall of the capsule. This was then dissected out, and looked like a piece of gangrenous intestine. It was then decided to remove the kidney, and the pedicle was ligatured by transfixion, and the kidney removed. Unfortunately, after examination of the removed organ, no stone could be found, and as the presence of the stone was certain, a further search was made, and a hard piece of fatty tissue was incised, and the stone removed. The explanation was, that in holding the kidney up to assist its removal, the stone had dropped down, and had been in some manner included in the part which had been ligatured. Drainage tubes were inserted, and the wound brought together. After the operation there was vomiting of greenish fluid, which stopped after the administration of a little brandy and soda. At 3 p.m. on the same day the temperature was 98°, pulse 120, respirations 32. Urine was passed spontaneously. Very little pain. Barley water was given, and at 8 p.m. the tempera-

ture was 98·2°, pulse 120, respirations 32. July 29.—Temperature 98°, pulse 116, respirations 24. Twenty-four ounces of urine passed in the last twenty-four hours. Wound dressed, and injected out with boric acid lotion; tubes removed, cleansed, and replaced. Slept well during night. Thirty-eight ounces of urine passed in twenty-four hours. On the fourteenth day after operation, the patient was allowed out of bed, and returned to her home at the end of three weeks with a small granulating wound where the tube had been removed.

A NEW PROCEDURE FOR THE CURE OF CONGENITAL TALIPES VARUS AND EQUINO-VARUS.

By T. N. FitzGerald, F.R.C.S.I.

Senior Surgeon to the Melbourne Hospital.

That all the various operations designed since the time of Delpech, for the treatment of talipes, have turned out in practice with only more or less modified success, is a truism that requires no re-assertion.

The very number and variety of methods that are constantly being suggested, and the differences of opinion that exist as regards their respective merits, are sufficient evidence that either the nature of this deformity is not properly understood, or that, through some default, our remedial measures have not yet fallen into a really satisfactory direction.

In my own experience, the various surgical procedures of tenotomy, tarsotomy, and tarsectomy, combined with manipulations, are not infrequently failures; at all events, their success is by no means commensurate with the promises of their originators and advocates. In some instances, the cases relapse; and not infrequently, if the appearance of the foot is improved. the results, as regards the usefulness of the member, are but little better than the original condition. And if in the proceeding of tarsotomy or tarsectomy, fibrous, instead of osseous, union should happen to take place, then the state of affairs cannot be deemed satisfactory.

In considering the causes of these failures from a practical and clinical standpoint, I have formed some conclusions as to the nature of talipes varus or equino-varus, and have in consequence been led to devise a new method of treatment.

It is not necessary to enter at length into the various opinions which have been expressed as to what joints or parts of the foot are distorted and misplaced in this deformity; suffice it to say, that I am entirely in accordance with Mr. Parker in his opinion, as expressed at the last August meeting of the British Medical Association, in the discussion on club foot. Mr. Parker considers that every structure of the foot is involved, but I also further hold that in severe cases, resistance to the replacement of the deformity results from structural changes in the bone,

as well as the alteration of the relative positions of their articular surfaces. This condition is very well described by Mr. William Adams in his able work on "Club-Foot." That this is so Mr. Parker admits, but he differs in considering that it is not an essential part of the deformity. The idea that the bony change is the difficulty, is the foundation of all operations such as those devised by Messrs. Lund and Davies-Colley. However, there is this objection to all procedures, which require for their fulfilment the resection or the removal of some portion of the tarsus. The malposition may be remedied, but it is a great disadvantage to leave the foot permanently weakened.

Now I hold very strongly that, whatever the etiology of club-foot may be, the principal factor is impaired nutrition of the whole foot, and particularly of the bones. How this occurs "in utero" is unnecessary for me to discuss. But everyone concerned in medical practice must have observed the frequency with which talipes is associated in a family (as instance the two brothers whose cases are related at the end of this paper), or in the same child, with other deformities such as hare-lip, cleft palate, spina-bifida, imperforate anus and hernia. These abnormalities are admittedly due to arrest of development; but the cause is inexplicable.

With respect to the pathology of club-foot, the following seem to me to be the anatomical peculiarities in a severe instance of equino-varus:—The astragalus is displaced forwards, outwards, and downwards, so that the trochlear surface projects in front of the tibia; the outer side of its neck is elongated, and the head directed inwards.

The scaphoid is displaced, and approximated to the os calcis and inner malleolus; the external malleolus is apparently considerably thrown backwards, but in reality it is only slightly displaced. The os calcis is nearly vertical; its tuberosity is drawn upwards and inwards, and the whole bone generally presents a crescentic shape. The upper surface of the cuboid, and the head of the fifth metatarsal bone, are turned downwards. The tendo Achillis is nearly always contracted, and also the tibialis anticus and posticus tendons. The calcaneo-scaphoid ligament is contracted and shortened, the astragalo-scaphoid ligament is lengthened, and the plantar fascia and other fibrous structures contracted as described by orthopaedic surgeons—this latter being the real cause of the deformity of the sole of the foot.

What operative measures then can be adopted which may remedy these structural changes of form, these mal-positions of the bones, without much risk to the patient, without weakening the foot, and by which at the same time nutrition can be improved?

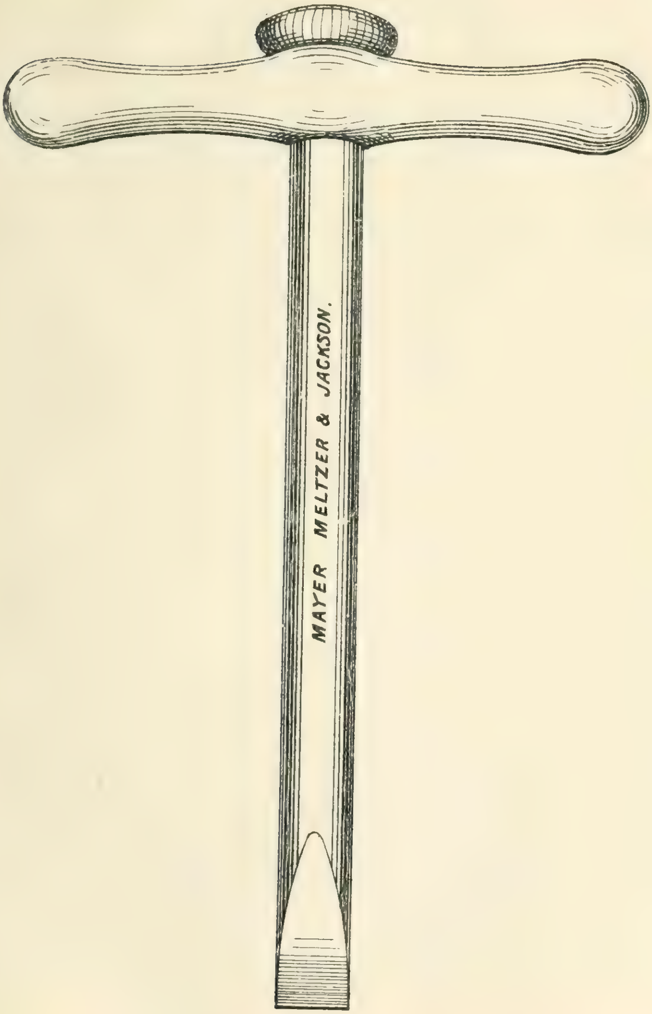
In another paper, I have drawn attention to the marked effects of subcutaneous drilling and gouging in improving the nutrition and vitality of bone in cases of ostitis; and it occurred to me that if the poorly nourished and mal-formed bones in talipes were sufficiently broken up subcutaneously, and at the same time all resisting fibrous structures were freely divided, the displacement could be rectified by a process of forcible moulding together of the bones. In this way, the osseous tissues, rendered soft and malleable so to speak, would be capable of being crushed together or flattened out as occasion required. Repair would then set in, new tissue be formed, and the improved

position be rendered permanent, with the probability that the whole nutrition would be improved instead of impaired, the foot strengthened instead of weakened.

The operation I perform is as follows:—An Esmarch bandage is applied from the toes to above the knee. The following tendons are then divided: the tendo Achillis close to its insertion, the tibialis anticus just above the ankle, the tibialis posticus about an inch and a half above the inner malleolus, in the usual way. When this part of the procedure has been completed, it becomes comparatively easy to judge the amount of resistance offered by the contraction of the ligaments and fibrous structures of the sole. The fear that the divided ends of the tendo Achillis will not unite, if severed as directed, is, I am satisfied, groundless. It is simply necessary to see that the gap (no matter how large), which is occasioned when the parts are separated, is not obliterated by the too firm pressure of the bandage. To avoid this, I protect the ends and intervening space by a piece of cardboard, over which the bandage is evenly and gently applied. This portion of the tenotomy being concluded, the plantar fascia, the calcaneo-scaphoid ligament, the deep ligaments, the abductor pollicis, and all resisting structures down to the astragalo-scaphoid articulation are freely divided. I often find it necessary to sever some of the anterior fibres of the deltoid ligament. If the artery and nerve come in the way, their incision does not seem to affect the issue in the slightest.

Next comes the osteotomy, and as this is the most important part of the operation, it will be well to be somewhat full in its explanation. The instruments used are an ordinary tenotomy knife, rather long in the shaft between the blade and the handle, and a chisel (a full sized representation of which is given in the annexed diagram). The chisel is made of the finest steel, its cutting extremity is bevelled like a V, similar to Macewen's osteotome, and the stem is of a uniform size and perfectly smooth and round, and just sufficiently long that it can be grasped with the hand, and at the same time perfectly controlled by the forefinger resting on and commanding the blade. To one accustomed to handling instruments, the importance of the chisel being of a manageable length can be easily understood, though at the first glance it may seem an unimportant matter.

To proceed, the astragalus is first divided through its neck; to effect this, a valvular incision, just sufficiently large to admit the chisel, is made with the tenotome, obliquely down to the bone, the knife being entered on the outside of the foot, slightly inclined from above downwards, a little backwards and inwards, behind the calcaneo-cuboid articulation, so that it passes in its course through the foot immediately in front of the ankle-joint. The tenotome being withdrawn, the chisel, firmly held, is pushed along the channel the knife has just made, so that it impinges on the bone at the spot where the astragalus may be said to narrow to a neck. The chisel enters this constriction, and with a little force by pushing and twisting, it is manipulated in such a manner, that the head or part of the bone which enters into the astragalo-scaphoid joint, becomes detached from the body. The inner aspect of the foot is now attacked, and the scaphoid freely broken up subcutaneously. The os calcis is now subcutaneously divided


MAYER MELTZER & JACKSON.

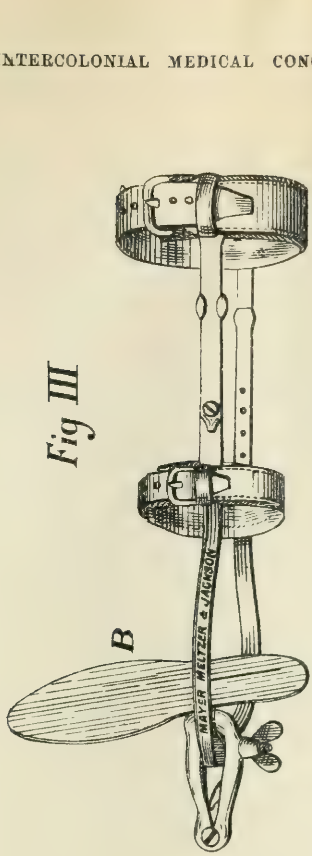


Fig III

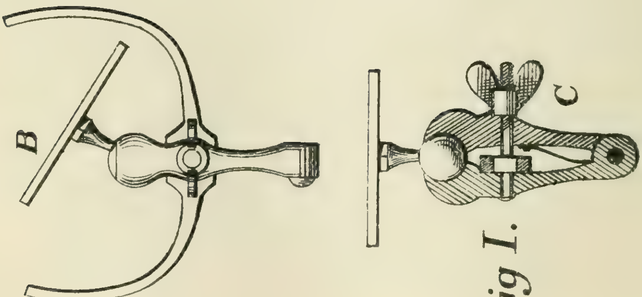


Fig II.

Fig I.

obliquely, at a point just behind the posterior articulating surface, in fact separating the bone into nearly equal halves. A few drills are put into the cuboid to help nutrition, and this finishes the actual operation.

The next aim is to mould the foot into a normal position, and to do this, considerable force is required, and it is well to have the help of a trustworthy assistant, so as to prevent fracturing the tibia or fibula close to the joint, or separating the epiphyses.

The rotation of the tarsal bones may be assisted by enrolling the foot in a wet towel, or the member may be levered into position by means of a flat piece of wood firmly attached to the sole of the foot, and the os calcis forced into place. By these means, and the exercise of a little patience, it will be found that the foot can be nearly fashioned into good position. Any little fragment of the scaphoid that sticks out, or is unduly prominent, may be hammered back by a mallet, interposing a roll of bandage between the foot and the blow.

All that now remains is to roll the foot in antiseptic wool, and apply firm but even pressure from the toes to the knee. The limb is put in a light trough splint, with a foot-piece so adjusted that it keeps the foot in good position, *i.e.*, at right angles with the leg; the Esmarch tourniquet is then removed. In three or four days, when the superficial wounds are healed, I apply the little splint depicted in the diagram.

Fig. I. shows the ball-and-socket joint. Fig. II., the foot-piece (B), on the outer side of which there is a small plate, so that the projection from the ball can be screwed into it, thus allowing the foot-piece to remain on the sole when the splint is removed. Fig. III. is a full view of the whole apparatus.

The foot that has been operated upon is firmly and evenly strapped to the foot-piece (B), and the limb is laid in the splint, which is carefully adjusted to the leg; the ball portion lying free in the socket is then screwed into the foot-piece; the foot is then turned to the desired angle, and is held in position by tightening the screw C in Fig. I.

For a fortnight, the case requires careful watching, and should be seen almost daily, in the event of any undue pressure occasioning sloughing. At the end of this time, when the foot is taken down and examined, it may require some little re-adjustment, and should be put up again for another week. The whole splint, with the exception of the foot-piece, should be now removed every morning, and gentle passive motion used, and the child may be permitted to walk on the foot-piece. At night-time, the splint should be put on, and the foot adjusted to the position desired.

At first sight, this operation, no doubt, appears rough and unsurgical from the amount of force that is required to twist the foot, but the same is the case with many other proceedings, the utility of which is not in the least doubted.

A question that naturally arises is, whether there is not, in breaking up the scaphoid and chiselling off the head of the astragalus, a risk of separating the fragments from their attachments and nutritive supply, thus setting up necrosis? Such has never occurred to me, and I think the danger apprehended rather chimerical, provided that the cutting is strictly subcutaneous, and that absolute cleanliness is rigorously observed.

Some of my cases have been sent from the Melbourne Hospital for inspection. The little fellow, Simon T., who walks so well and straight, was one of the worst forms of double equino-varus. The operation was performed within the last three months at the hospital, and was witnessed by several gentlemen present. The little boy, John B., aged 6, with the thin legs, but large feet, was an extremely bad case, in fact he never walked before his admission to the hospital, three and a half months ago; he crawled on his hands and knees, or was pushed along in a small conveyance. His feet are straight and flat on the ground, but he does not "handle" them well yet, although he walks strongly and straightly. A most interesting feature about this case is, that the right tibia was over an inch shorter than its fellow, and that by drilling the upper and lower epiphyses the leg grew an inch in eight weeks, and is now only a quarter of an inch shorter than the left. (Photographs are given of this boy before and after operation).

Out of many cases, I select for illustration the photographs of two brothers, Robert and Alfred C., aged respectively 8 and 6. They were admitted to the Melbourne Hospital, and operated upon in the manner described. The photographs speak for themselves. Before the operation, the feet were turned so that the boys walked entirely on the outer side of them, and ambled about with the peculiar gait and roll which are seen in all cases of aggravated equino-varus. They left the hospital within two months of the operation, walking on the soles of their feet, as shown in the photograph.

For the most part I find, that if the osteotomies and tenotomies are fearlessly and carefully performed at the time of the operation, very little subsequent handling is required; but occasionally I meet with feet where resistance to re-shaping is out of the common. These cases not only require patience on the part of the operator, but their treatment should be undertaken with every confidence that in time they must yield to the measures adopted.

I have now operated on twenty cases at the Melbourne Hospital alone during the past year, and up to the present, with almost invariable success. In one case some sloughing took place, and for a time I was afraid that more of the foot would become involved than I cared for, but a few days relieved my fears, as the slough was merely superficial.

Discussion ensued.

Dr. Gardner said that no one present in that theatre had ever seen better results than those exhibited by Mr. FitzGerald. It did not matter what theoretical objections they might have to the treatment —they might say it was wrong, and calculated to set up acute inflammation, but in the face of what Mr. FitzGerald had done so many times, they must be silent. He had learnt from Mr. FitzGerald the operation of drilling in bones, and he invariably drilled in suitable cases. If drilling was done in the early stage, the disease would be stayed. He was fully determined to adopt Mr. FitzGerald's method in talipes. On one or two occasions he had performed, with good results, Davies-Colley's operation. He congratulated Mr. FitzGerald on his excellent paper.

NEW OPERATION FOR TALIPES

(MR. FITZGERALD'S PAPER)

JOHN B., ÆT. 6. BEFORE OPERATION.—HAD NEVER WALKED.

NEW OPERATION FOR TALIPES

(MR. FITZGERALD'S PAPER)

JOHN B. ÆT. 6, AFTER OPERATION.—STANDS AND WALKS WELL.

NEW OPERATION FOR TALIPES

(MR. FITZGERALD'S PAPER)

R. C. AND A. C. BEFORE OPERATION.

NEW OPERATION FOR TALIPES

(Mr. FitzGerald's Paper)

R. C. and A. C. BEFORE Operation.

NEW OPERATION FOR TALIPES

(Mr. FitzGerald's Paper.)

R. C. and A. C. AFTER Operation.

Dr. O'HARA said he was so struck with what he heard about Mr. FitzGerald's operation for talipes, that he availed himself of the opportunity he had had of going to the hospital to see him operate. When he saw him at work, he was perfectly thunderstruck. It seemed as if he could mould a foot to whatever shape he wished. Mr. FitzGerald's operations would supersede several of the old-fashioned ones.

Dr. RENDLE said they might look upon Mr. FitzGerald's paper as one of the most original and valuable that had been brought before the Congress. He was struck with the originality and completeness displayed in the operations. One great advantage over the operations of cutting out was, that Mr. FitzGerald not only set up new action and relieved irritation, but he preserved the attachment of the ligaments and tendons. That was a great point, and one which would make his cases more successful than those of other operations. It was well-known how unsatisfactory the old method had been. He had watched the practice in Guy's Hospital in London, and he must say that the cases in which there were satisfactory results were very few indeed. He never saw there any cases at all equal to those shown them that day. Even Mr. FitzGerald, with his great originality and courage, would hardly have dared to perform the operation on the tarsus, if he had not had previous experience of drilling in ostitis and bone disease. He was quite converted to Mr. FitzGerald's operation for club-foot.

Dr. C. S. RYAN said he rose to express the admiration he felt on seeing one of the operations performed. He had had the privilege of being present when Mr. FitzGerald operated on the boy Hennessey. If anybody had then told him that he would see that boy walk on the soles of his feet he would not have believed him. However, it had happened, and it was one of the greatest triumphs of the day. Since then, he had seen two cases equally satisfactory. He did not think anybody who had seen those cases would fail to be convinced that there was a great deal in the operation. Since seeing them, he had done two himself at the Children's Hospital, and the results were in every degree satisfactory. No operation but that performed by Mr. FitzGerald would have given such satisfactory results.

SUBCUTANEOUS DRILLING IN THE TREATMENT OF BONE INFLAMMATION.

By T. N. FITZGERALD, F.R.C.S.I.

Senior Surgeon to the Melbourne Hospital.

I wish to bring before you briefly the method of treating chronic and sub-acute inflammations of bone which I have practised for very many years. Of its efficacy, I am convinced by constant verification; and it attacks a condition of inflammation which, owing to the anatomical relations of the part implicated, is particularly inaccessible to the ordinary means at our disposal.

The method consists in subcutaneously puncturing the bone in many places with a drill inserted through a valvular skin opening; this

prevents the access of air, and renders the proceeding truly aseptic. In this way, I frequently apply the drill to the shaft and extremities of the tibia, to the trochanter femoris and the cervical portion of the bone, to the bones of the tarsus and metatarsus, to the corresponding bones of the upper extremity, and to the lower jaw, for chronic inflammation and sub-acute exacerbations of the inflammatory process of these bones.

Believing that the terms periostitis, osteomyelitis, and endostitis are founded on theoretical rather than practical reasons, I have no hesitation in passing the drill through and through the medullary cavity, and in scoring the periosteum deeply with a tenotome.

From anatomical conditions, inflammations in any one of the differentiated portions of bone must implicate the other component parts, either by their intensity or their long continuance. This pathological consideration, this recognition of ostitis as an affection of the whole bone, has an important bearing on the treatment; this can be tested clinically by the use of the drill and the tenotome, and the treatment of chronic bone inflammations ought to include the use of both instruments.

There is little use in trying to combat bone inflammation with remedies which from all time have proved so efficient in inflammations of other textures. Rest, moist heat, depletion, and counter irritants are here, by themselves, almost unavailing. In the soft parts, where the tissues have become engorged and constricted with exudations, and strangulation is imminent, relief may occur by increased activity of the absorbents immediately outside the area of turmoil, and if the condition must end in necrosis, nature can remove the necrosed portion. But for bone there is no such succour, no such vent; enclosed in unyielding, indistensible channels, the unaffected healthy lymphatics lying just outside the inflammatory focus can neither increase in size, nor perform much more than their usual tasks.

Within the area, for a while, all is stagnant, till tension-relief can be effected by slow expansion and absorption of the bone channels, resulting in that rarefaction of the osseous tissue which affords sufficient room for the exudation, without that pressure which ends in death.

The question of pressure is, undoubtedly, the important one in all inflammations of bone. Clearly then, in the treatment, the relief of tension by assuring efficient drainage is the prominent point. The essential feature of bone inflammation is the plugging of the nutritive and natural drain channels; and therefore, for restoration, the removal of all inflammatory products is imperative. In this direction, the surgeon can come to Nature's aid by the use of either the trephine or the drill.

When a bone cavity can be accurately diagnosed, or when it is required to evacuate pus, or free sequestra, the trephine, as suggested by M. Ollier, is an instrument that is perfect in its action, and effects exactly what is desired. However, the smallest instrument inflicts a considerable wound, which, whilst it remains open, is at any time subject to infection. There is always more or less liability of severely injuring the periosteum, or occasioning bleeding, and it is an appliance a surgeon would reluctantly use in instances where the diagnosis was

doubtful. On the other hand, the drill that I have been in the habit of using weekly for the last twenty years, is a surgical instrument that, in most regions, is easy of application. The subcutaneous incision through which the blade passes to reach the bone is of the smallest calibre, and the pain resulting from the drilling, as a rule, scarcely amounts to an ache, which soon passes off. There never is, and never can be, the slightest danger of conveying any infection if ordinary cleanliness be observed.

Again, I am constantly in the habit of drilling bone tissue, of which I am doubtful, and I feel sure I have saved many a limb in consequence. If it does no good, it can do no possible harm. It is advisable to use it several times, in fact in eight or ten different places around the suspected area, penetrating to the medulla or right through the cancellated structure on each occasion; but I must repeat, that I never fail to see that perfect cleanliness is observed. With this precaution, the results obtained have been most satisfactory. To relate the history of even some of the many cases in which the drill has shown its utility, would be to occupy too long a time; and besides, ostitis is of such frequent occurrence, that any surgeon can easily test the efficacy of my method himself. But I will take the liberty of enumerating a few of the affections where this instrument, in my hands, has proved eminently successful.

The drill I generally use is Woake's, as supplied by the instrument makers, but I now prefer a modification of the boat builder's bradawl, fitted to a proper handle; the shaft is square, and easily passes through ordinary bone tissue.

The patient here presented to you, Mr. P., is 25 years of age, a clerk. For the last two years, he has had repeated attacks of severe localised inflammation of the right tibia, just below the head, and extending down the shaft for about three inches. He generally obtained relief after a week's rest, and by the application of leeches and hot fomentations, with the internal administration of iodide of potassium, and occasionally a Dover's powder at night. Mr. P. was brought to my consulting room in great agony. I caused him to be placed under the influence of an anæsthetic, and at once, subcutaneously, put eight drills into the medullary canal, ordered the limb to be supported by a flannel bandage, and that the patient should rest for two days. You see him here, seven days after the operation, without a limp; he will tell you that he has no pain, and that he is better than he has been for a length of time. It may be said that the relief will be only transitory, but the records of a large number of similar cases prove otherwise.

For instance, under almost exactly the same conditions, I operated on a bank inspector, seven years ago, Mr. M. (well known in this city), who had been a very great sufferer for years, and periodically had exacerbations of acute tibial ostitis of a very severe character, with nocturnal pains so great that he had to resort to narcotics. A long incision was made by a surgeon down to the bone, dividing the periosteum to the extent of over three inches. Until the wound healed (some eight weeks) he was fairly free from pain, but it at once recommenced the moment the wound closed. In my consulting room, and without an anæsthetic, I put a few drills subcutaneously right through the bone. Mr. M. was able to attend his office two days

afterwards, and has not had the least pain since, and is in the enjoyment of perfect health. For this form of affection I have drilled, successfully, most of the long bones, and continue to do so weekly.

The os calcis is not uncommonly the seat of a form of gouty ostitis, which does not easily give way to ordinary treatment. I find that half a dozen drills, three inserted obliquely on each side, with a little additional treatment, relieve pain, and soon restore the heel to its normal condition. Allow me here to give one instance:—J. C., an auctioneer, a tall, stout, hearty-looking man of about 60, had been a great sufferer from pains in both heels, aggravated considerably by walking or standing. He had several attacks of gout, and believing these pains to be dependent on this affection, resorted to the usual anti-gout treatment, but without much relief. He also tried all kinds of circular pads, &c., endeavouring to take off the weight from the sore spots. In this case, and without an anæsthetic, I drilled both heels as described. Mr. C. limped away from my rooms, and was able to attend at his office two days afterwards. It is now two years since the bones were drilled, and Mr. C. remains quite free from his old pains.

In articular ostitis, when from extension of the inflammation or interference with nutrition the joint trouble begins to show itself, it is really wonderful what the timely and free application of the drill will do. A case, for instance, that came under my notice, is a good illustration:—A girl, æt. 16, was admitted into Ward 5, under my care, at the Melbourne Hospital. Her history was that nine weeks previously, whilst running after a cow, she slipped and fell somewhat heavily on her hip. She did not feel very much pain at the time, and was able to go about with a limp for several days after her fall. On rising in the morning, the joint was very stiff, and she was unable to move it until, as she expressed herself, "the hip got warm." At the end of a week, she began to feel a deep-seated pain in the hip, and the pain increased at night time, or rather towards early morning. She continued to move about, but with increasing difficulty, till the end of the third week, when she took to bed, and the family doctor was called in. Under treatment, she improved to a certain extent, but could not walk without pain, and she was obliged to take a sedative to relieve the nightly pains. On admission to the hospital, evidence of having gone through pain or trouble was plainly written on her countenance. The left leg was apparently elongated and slightly abducted; the limb could be moderately adducted, but this caused pain. There was a form of solid œdema around this hip joint, but superficial manipulation could be borne. However, deep pressure caused pain over the trochanter, but not down the shaft of the femur; slight fluctuation could be detected in the hip joint. Eight drills were inserted subcutaneously into the trochanter, and two sent along into the neck of the bone. The joint was subcutaneously opened by a tenotome from behind, and a rather free cut made into the capsule. A 4 lb. weight was attached to the foot in the usual way, and sand bags placed on each side of the limb; the next day, pain had disappeared. In a fortnight a leather splint was applied, and the patient allowed up. The girl left the institution within a month perfectly well, and is now in good health, and walks without the slightest lameness. The same form of treatment equally applies to other joints.

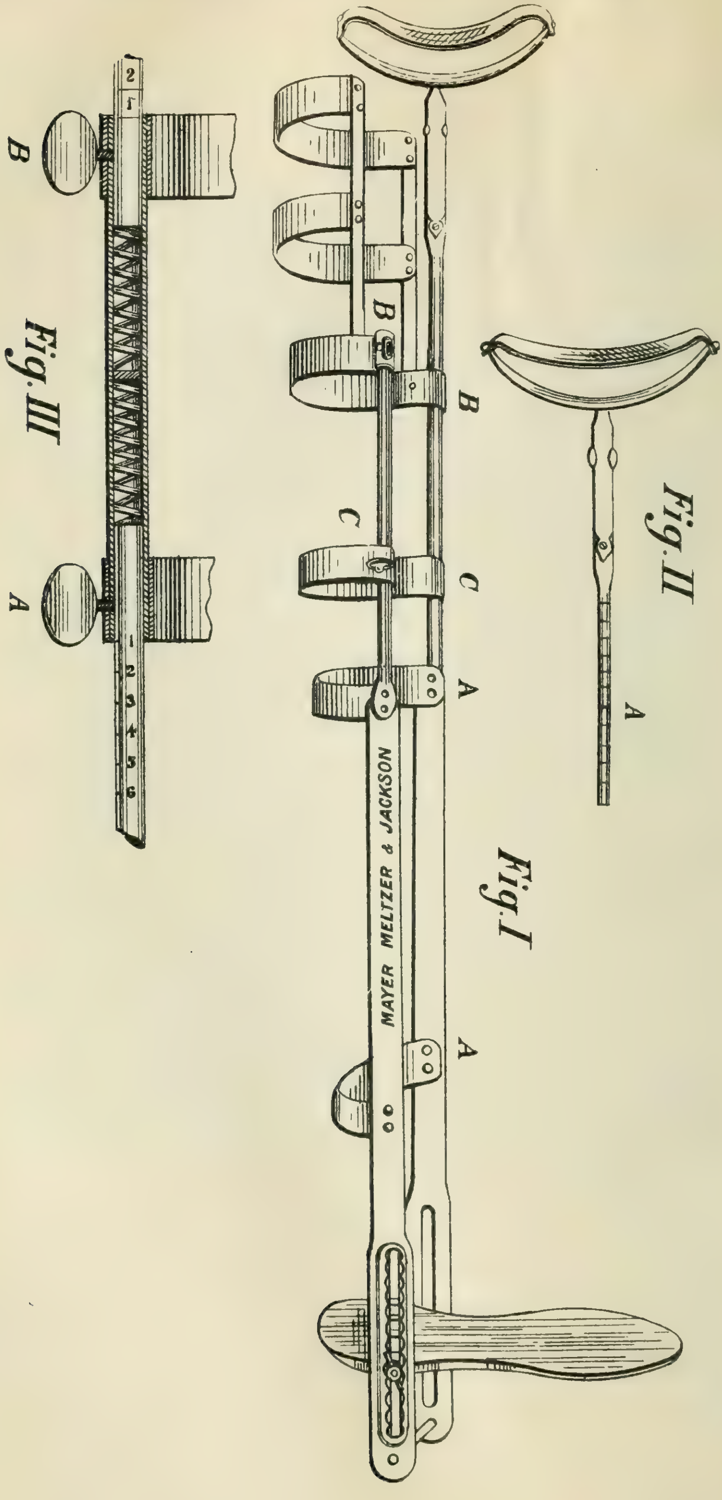


Fig. I
Fig. II
Fig. III
MAYER MELTZER & JACKSON
A
B
C
1
2
3
4
5
6

A short account of a knee-joint case may be interesting. The patient, a stout healthy man, was brought to me by a suburban practitioner, who related the case as follows :—

Sixteen months previously the man met with a severe injury to the knee joint, caused by falling from a buggy ; the joint was very much wrenched and twisted. The parts were greatly swollen for several weeks, and from the description, there must have been considerable synovial effusion. Leeches, fomentations, &c., were applied, and at the end of a few weeks the swelling greatly subsided, and the patient was able to get up and move about a little. This appeared to make him bad again, and he subsequently had several relapses after each attempt to use the limb. Some six months after the accident, the joint seemed to remain fixedly swollen, and a dull aching pain began to trouble him at night, more particularly in the internal condyle; and as his condition did not improve, he came to town for advice about sixteen months after the injury. On examination, the knee was found to be slightly flexed, and the joint considerably swollen. Fluctuation could not be detected, but the synovial membrane was greatly thickened, and apparently undergoing degeneration. The patella was firmly attached to the femur, although it could be slightly moved by using force. Chloroform was administered and Esmarch's bandage applied, the tourniquet being fastened well up the thigh. The ham-string tendons were first freely divided, and the synovial membrane subcutaneously sliced in several places ; four drills were inserted obliquely into the inner condyle, the joint enveloped in antiseptic wool, and a flannel bandage firmly applied over all; the tourniquet removed, and the limb placed on a posterior splint. In three weeks, Scott's dressing was used, and gentle passive motion tried. The man was under treatment for two months, and returned to the country, and quite recently he wrote, saying that he could use his injured leg just as well as the other.

The amount of drilling and breaking up that bones will stand, provided it be done aseptically, that is, subcutaneously, is surprising, far beyond what is generally conceived.

In as few words as possible, I will sum up what I consider to be the great advantages of drilling. The instrument is easy of application, and there is no doubt as to its efficacy in chronic and subacute bone inflammations; the rheumatic or syphilitic character of the inflammation does not contra-indicate drilling. Its use is absolutely harmless, and does not prevent further operation, such as an open wound procedure, or repeated drillings. It is based on the correct surgical principles of drainage, stimulation, and asepsis.

The diagram represents an extension splint I have been in the habit of using for some years, in affections of the knee joint, where steady support and extension are the surgical principles to be maintained. The framework of the splint is made of very light sheet iron, similar to that used in the construction of the ordinary McIntyre fracture apparatus, only there is no necessity for its being so stout and inflexible. Its parts are arranged as follows :—Fig. I., B to C, are hollow tubes, each containing double spiral springs, as shown in Fig. III. Fig. II. shows a crutch extremity, over one end of which is stretched a soft leather band, and the end so made that it can glide easily into the first mentioned tubular portion of the splint, viz., B to C in Fig. I, and B in

Fig. III. The crutch can be transferred from one side to the other, according to the limb affected. Fig. III. indicates the position of the springs, the screws which maintain their compression, and the index by which, when the splint is adjusted, the amount of extension can be registered.

One of the advantages of this simple apparatus is that the patient can sit up, and thus the irksomeness of confinement to bed becomes shorn of half its monotony. The lightness of the apparatus is another circumstance in its favour; the invalid can be removed from bed to a wheel-chair with very little exertion on the part of the nurse. Moreover, the apparatus permits of the knee joint being examined—synoviotomised, tenotomised, drilled, or whatever may be required—with scarcely the shifting of a single bandage. In this country, it is well known that scrofulous articular affections are less frequent than at home; consequently, the field for surgical practice in this direction is rather limited, compared with the experience obtainable in any large town in the old country. Nevertheless, a large number of joint disorders do come under our notice, and I generally find that with the extension this splint affords, and free section of the synovial membrane and drilling, the results are good. If these cases come under observation at anything like a reasonably early stage, they can inevitably be brought to a happy issue; this much I can say, that I have not had to amputate a leg for disease of the knee for some years.

To apply the splint, the crutch end is first inserted into the tube fitted for its reception; the same with the portion A, Fig. I., and the part B C. The springs are then forcibly compressed, and retained by their respective screws. The foot piece is next adjusted, and the splint lengthened or shortened in such a manner that when the leg is laid on the framework, the leather band of the crutch comes well up into the fork, and bears just comfortably on the descending ramus of the pubes; the appliance of course requires padding. The foot should be nicely strapped to the foot piece, and the whole splint, excepting from C to A, attached to the limb with adhesive plaster and a bandage. When the two separate parts of the splint have been nicely and firmly adjusted to the leg, the screws are let go at C, and the desired tension is exerted on the joint.

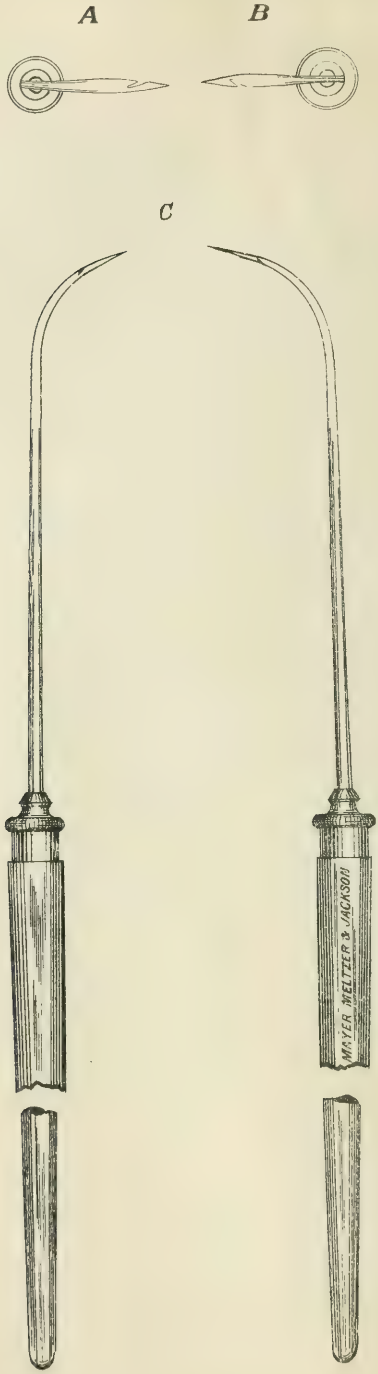
A CASE OF CLEFT PALATE.

By T. N. FitzGerald, F.R.C.S.I.

Senior Surgeon to the Melbourne Hospital.

John G., æt. 14, was admitted to the Melbourne Hospital about ten weeks ago with cleft of the soft palate. On admission, he spoke with the usual guttural and nasal twang, but much pronounced.

He was operated upon a few days after admission—six sutures were inserted, immediate union took place, the uvula was well formed, and in fact at present the line of incision is hardly perceptible, as you may see.


A
B
C
MAYER MELTZER & JACKSON

The reason for bringing this case under your notice is, to illustrate the great advantages to be derived from massage after such operations.

In this instance when the parts were firm, some three weeks after the operation, the palate was massaged by one of the students under the supervision of Dr. F. D. Bird. The improvement in the lad's speech was very marked ; he now speaks very well, as you can hear, and his articulation is daily improving. I am sure the massaging has greatly helped to improve the muscles of the palate.

An engraving is shown of the needles employed in this case, and which I have been in the habit of using for some years.

It is universally acknowledged, that the introduction of the sutures is the most troublesome part of the operation. However, by the use of these needles, this difficulty is in a great measure overcome. They are thus employed :—The thread is inserted into the slot shown at A, which is cut into the upper side of the needle (by an error, the engraver has made it appear as if the slot for carrying the thread was on the lower side, and on the upper for withdrawing the needle, the reverse is the case), and thus armed, its point is introduced in the ordinary manner through the palate on the child's right, that is, with the surgeon's left hand. The needle B, which is slotted on the lower edge, is entered on the opposite side, and when behind the cleft, is partly rotated in such a way as to catch and hold the thread from the other needle, which is pulled through as the needle is withdrawn.

These needles require to be very carefully made, the notch being deep and yet only just wide enough to admit fine thread. This of course may be used to afterwards draw through any suture material desired. By the aid of these needles, I have on several occasions been able to complete the whole operation, from the time the chloroformist has signified that everything was ready, to the fastening of the last stitch, in fifteen minutes. In the case of this boy, I believe the operation was completed in somewhat under that time.

HYDATID DISEASE.

A General Meeting of the Congress was held in the Wilson Hall, on Wednesday, January 9th, at 11 a.m., when papers were submitted, and a discussion held concerning Hydatid Disease in Australasia. The chair was occupied by Dr. E. C. STIRLING, President of the Section of Surgery.

In opening the proceedings, the CHAIRMAN said :—As our President told us the other day, and as the President of the last Congress told us, there are not many questions on which we in Australia can offer advice or instruction to our teachers and masters of the old country, but if there is one subject in which we may ourselves take up the position of teachers, it is in the matter of Hydatid Disease.

The following papers were then submitted :—

HYDATID DISEASE.

By JOHN DAVIES THOMAS, M.D. Lond., F.R.C.S. Eng.

Joint Lecturer on Medicine at the University of Adelaide. Physician to the Adelaide Hospital.

THE GEOGRAPHICAL DISTRIBUTION OF ECHINOCOCCUS DISEASE.

Probably, no known parasite has so extended a geographical distribution as echinococcus enjoys; for it is generally found to exist, with greater or less frequency, wherever man and his faithful friend and companion, the dog, are associated. Up to the present time, trustworthy statistics, showing its prevalence in most of the civilised countries of the world, are conspicuous by their absence. How scanty the published data upon this subject are, is clearly indicated by the brief space allotted to this disease in Hirsch's admirable "Hand-book of Geographical and Historical Pathology," a translation of which has been published by the New Sydenham Society. Enough, however, is known, to prove that echinococcus flourishes under almost all climatic conditions, for it has been met with in Europe, Asia, Africa, North and South America, and in all the colonies of Australasia; whilst chilly Iceland and sunny Australia vie with each other in offering this unwelcome immigrant a congenial home.

Hydatid Disease in Europe.

There is probably no country in Europe in which at least the occasional presence of echinococcus has not been noticed, but its frequency ranges within very wide limits. In Iceland, it is so frequent as to constitute a national calamity; in the northern parts of Mecklenburg, too, it occurs with unusual frequency.

When engaged a few years since in an enquiry into the geographical distribution of hydatid disease, it seemed to me that the most reliable

sources of information would be, (1) the official returns of the causes of death in the various countries, and (2) the hospital statistics, especially as regards their in-patients. It is obvious that, at best, the data supplied from these sources can be but approximate, still they may serve for the purposes of a general comparison. Unfortunately, however, the available facts are but few at present.

Great Britain.

Cobbold ("Parasites, a Treatise on the Entozoa of Man and Animals") refers to the defective evidence supplied by the returns of the Registrar-General in respect to deaths from this disease, and he points out that the blame should be attached, not to the department under the control of that officer, but to those who supply the certificates of the cause of death.

In the table appended, there appear the number of deaths in England and Wales which were attributed to hydatid disease during the sixteen years preceding 1887.

TABLE I.—*Table showing the Number of Deaths returned as due to Hydatid Disease in England and Wales from* 1871 *to* 1886 *inclusive*:—

YEAR.	MALES.	FEMALES.	TOTAL.	TOTAL DEATHS FROM ALL CAUSES.
1871	—	—	37	514,879
1872	—	—	41	492,265
1873	—	—	34	492,520
1874	—	—	29	526,632
1875	—	—	43	546,453
1876	13	18	31	510,315
1877	—	—	51	500,496
1878	28	31	59	539,872
1879	22	29	51	526,255
1880	21	39	60	528,624
1881	23	28	51	491,935
1882	36	23	59	516,654
1883	25	28	53	522,997
1884	30	29	59	530,928
1885	21	25	46	522,750
1886	24	34	58	537,276

They amount to 762 deaths attributed to hydatid disease amongst 8,300,751 deaths from all causes, or 1 in every 10,893—in round numbers, say 11,000—deaths from all causes.

The average annual deaths recorded from this disease amounted only to 47·6. It is quite certain, however, that these returns greatly understate the frequency of this disease in England. This has been already remarked upon by the late Dr. Cobbold ("Parasites," p. 285) who stated his conclusions as follows:—"As regards hydatids, I believe the returns to be excessively deficient. In place of an average of thirty-four deaths annually from this cause in the United Kingdom (*sic*), I am of opinion, that at least four hundred deaths are

due to hydatids. This opinion, and the data on which it was founded were communicated by me twelve years ago to the Linnean Society, and I have since become acquainted with facts which lead me to conclude that my original estimate was very much below the mark. The post-mortem registrar of one of our large hospitals has told me that of late years as many as ten deaths might be reckoned as annually due to hydatids in their institution alone. In a smaller hospital, I ascertained that the average was about four. Obviously, if these estimates are correct, the Registrar-General's returns for the United Kingdom do not record a tithe of the annual mortality due to hydatids."

From enquiries which I have prosecuted independently, by means of the Hospital statistics of some of the principal London institutions, I can strongly confirm the statements of Cobbold. I have been able to examine the statistics of several London hospitals for many years; the chief data appear in the table attached. In the London hospital, during the five years, 1876-81, twenty-four cases were treated, amongst a total of 13,297 medical in-patients.

Cases of Hydatid Disease treated in certain London Hospitals:—

Name of Hospital.	Period over which the Returns Extend.	Number of Hydatids.	Total Number of In-Patients Treated.
St. Thomas' ..	11 years	44	34,559
St. Bartholomew's ..	21 ,,	108	115,402
St. George's	13 ,,	22	45,599
Middlesex	12 ,,	29	19,570
University College ..	11 ,,	26	25,322
		229	240,452

From the above table, based upon nearly a quarter of a million of in-patients treated in these hospitals, it may be roughly estimated that not more than one out of each 1000 suffered from hydatid disease, at any rate so as to render it their principal complaint. But it must be remembered that where post-mortem examinations are performed regularly, as in many hospitals, it is common to discover hydatids, the presence of which had been unsuspected during life. For example, Murchison ("Clinical Lectures on Diseases of the Liver," third edition, 1885, foot-note to p. 55), states that "Out of 2100 post-mortem examinations recorded at the Middlesex Hospital between April 19, 1853, and August 25, 1869, hydatids were found in only thirteen, or once in 161 cases; and in only seven of the thirteen cases, or once in 300 cases, were they the cause of death." A similar statement was made in 1869, by Dr. W. Ogle, at a meeting of the Royal Medical and Chirurgical Society, when he remarked that, "Cases of hydatids were very rare; in 3000 records of post-mortem examinations at St. George's Hospital, in eighteen only had he found notice of hydatids, which were the cause of death in six cases only.—(*British Medical Journal*, April 24, 1869; p. 387.)

In certain parts of England, however, the disease appears to occur more often—for example, in Cambridgeshire, for Dr. Bradbury writes

that "Hydatid disease is not uncommon in Cambridgeshire, probably owing to the quantity of surface-water drunk, in which sheep-dogs have deposited the ova of tænia echinococcus. During the last few years, I have seen ten or twelve cases of hydatids of the liver, and I have noticed that when cases have occurred elsewhere, many of the patients have at some time resided in Cambridgeshire."—(*British Medical Journal*, October 6, 1877 ; p. 472.)

In Scotland, hydatids seem to be met with even less frequently than in England, for Dr. Scott Orr (*Glasgow Medical Journal*, January 1876), has searched the records of the Royal Infirmary, Glasgow, from the earliest periods, but has only found three cases—one in the mamma, and two in the liver. Dr. Gairdner also states ("Clinical Medicine," p. 431), that among many thousand dissections, which he had either performed, or seen performed, during his connection with the Edinburgh Royal Infirmary, in only one instance had a hydatid been found in any part of the body, and it was in the upper part of the right lung. The patient also apparently came from Newcastle.

As regards the Continent of Europe, great variations in the frequency of the disease appears to prevail, but for the most part it cannot be regarded as a common complaint ; an exception to this rule exists, however, in the case of Mecklenburg. To this, allusion will be made hereafter.

Germany and Austria-Hungary.

The official returns of the causes of death for these countries, and indeed for the whole of Europe, have not been accessible to me. The only data are those procured from the published statements relative to the number of cases treated in the principal hospitals, and the revelations of their autopsies. In the case of most of these institutions, I am indebted to the writings of Neisser ("Die Echinococcen-Krankheit," Von Dr. Albert Neisser, Berlin, 1877), and of Madelung ("Beiträge Mecklenburgischer Aerzte zur Lehre von der Echinococcen-Krankheit," Madelung. Stuttgart, 1885). The returns for the huge K. K. Krankenhaus, of Vienna, were kindly procured for me by Professor Schroetter. The statistics for the Augusta Hospital, Berlin, were obtained from Berger("Inaug. Dissert." Berlin, 1885—see also, "Virchow and Hirsch's Jahresbericht," 1885, Vol I., page 315).

TABLE II.—*Table showing the Number of Cases Treated for Hydatid Disease in Certain Places :—*

PLACE.	CASES OF HYDATIDS.	TOTAL NUMBER OF PATIENTS TREATED.	PERIOD OVER WHICH RETURNS EXTEND.
Berlin (Augusta Hospital)..	14	—	1875–1885
Leipsic	19	—	1852–1869
Breslau	20	85,062	—
Nuremburg	none	15,500	—
Hamburg	none	18,000	—
Wurzburg	rare	10,000	—
Jena	1 annually	—	—
Vienna	63	232,336	1874–1884

It will be seen, both from the table of cases treated, and the table of the results of the post-mortem examinations, that over Germany and Austria-Hungary generally, echinococcus is not common; but in two places in Northern Germany, viz., Greifswald, and especially in Rostock, the disease caused by it is more frequent; indeed, so far as is now known, hydatid disease is more common in the northern parts of Mecklenburg than anywhere else in Europe, except in Iceland. This fact has not escaped the attention of physicians in that country, for under the auspices and supervision of Professor Madelung, of Rostock, an elaborate investigation was entered into, with the view of ascertaining the extent of this affection in Mecklenburg, and its local causes. The enquiry has resulted in the publication of a very interesting and valuable volume. The conclusion arrived at is that "Echinococcus disease occurs in Mecklenburg very much more frequently than in the rest of Northern Germany, and in the neighbouring Scandinavian countries."—(Madelung, op. cit., page 24).

TABLE III.—*Table showing the Number of Cases in which Hydatid Cysts were Discovered during the Performance of Post-mortem Examinations in certain Places:—*

PLACE.	NUMBER OF AUTOPSIES PERFORMED.	NUMBER OF CASES IN WHICH HYDATIDS WERE FOUND.	PERCENTAGE.
Berlin ..	4770	33	0·691
Dresden ..	2002	7	0·34
Göttingen ..	639	3	0·46
Breslau ..	5128	39	0·761
Erlangen ..	1812	2	0·11
Greifswald ..	1360	20	1·47
Rostock ..	1026	25	2·43
Prague ..	1387	3	0·23
Vienna ..	1229	3	0·24
Zurich ..	400	0	—
Wurzburg ..	2280	11	0·48

Norway and Sweden.

In Norway this disease is rare, for Oscar Bloch ("Virchow and Hirsch's Jahresbericht," 1882, Vol. I., page 309) reports a case recorded by Rolfsen, of subcutaneous hydatid of the back; the case had a special interest, "because it is the only example of echinococcus in a native-born person in Norway."

Denmark.

Krabbe reported to Madelung (in a communication, dated November 16, 1884, op. cit., page 23), "that in Denmark, echinococcus disease only rarely occurs; and, so far as he knew, it was not more frequent in any one part of that country than in the rest. In the hospitals of Copenhagen, perhaps, hardly one case yearly appeared."

Iceland.

This country has long had the unenviable fame of being that in which echinococcus causes its worst ravages, both in man and beast.

Krabbe, who was deputed by the Danish Government to investigate and report upon the subject, published the results of his enquiry in 1866. He states that it was only for about a century past that a body of properly educated medical men had existed in Iceland; nevertheless, there was good reason for believing that this disease had been as prevalent for centuries past in Iceland as it was known to be at the time of his visit. Schleisner, who travelled in this country in 1847–48, seems to have been the first writer who clearly recognised the true nature of the disease, for he remarks that "it is a disease caused by entozoa, which develop not only in the liver, but also in the whole organism." The subject was afterwards more closely investigated by Eschricht in 1853.

Very varied accounts have been given by different writers as to the prevalence of the disease. Thus Schleisner stated, "that among the 2600 sick who appeared in the medical reports, there were 328, or about one-eighth; and among the 327 under his personal care, fifty-seven, or more than one-sixth, in whom the liver was attacked by hydatids." Thorstensen, who practised in Iceland for more than twenty years, estimated that one-seventh of all the inhabitants had the disease. Gerault, who wrote in 1857, remarks that the official returns supplied to the Danish Government showed that not less than one-fifth of the entire population was infested with echinococcus. Eschricht's estimate was one-sixth. Other authorities regard these estimates as too high. Thus Finsen, who paid especial attention to this matter from 1857 to 1862, recorded that in the district of Ofjord, where he resided, and which had a population of about 4500 inhabitants, he treated on an average 596 persons per annum, of whom sixteen, or about one thirty-eighth, were cases of hydatid disease; and he was acquainted in this district with seventy-seven living persons who had then, or who had had, this complaint, *i.e.*, one fifty-eighth of the entire population. In the district of Thingo, which reckoned 5500 persons, the proportion of hydatids to other cases of disease was one to twenty first; and there Finsen knew forty-two persons attacked by this parasite, or one one-hundredth of the district population.

Dr. J. Hjaltelin ("Reports on the Progress of Practical and Scientific Medicine in Different Parts of the World," edited by Horace Dobell, M.D.; London, 1869, p. 287), the late chief physician of Iceland, wrote in 1869:—"That the endemic echinococci are very frequent in this country, both in men and domesticated animals, especially in sheep, is unquestionable; but their statistical frequency cannot, at present, be stated with any reliable certainty. The late chief physician of this island, Dr. Thorsteinson, who had paid a good deal of attention to this subject during his long career as the chief medical officer of Iceland, held that about every sixth or seventh of all the Icelanders were affected with echinococci. One physician still practising, living in the north part of this country, Dr. Skaptason, who has practised there during a period of more than thirty years, is of the same opinion. The third district physician, who has served for thirty-two years, viz., Dr. Thoraensen, and made himself famous by treating some cases of hydatids with electricity, fully agrees with the aforesaid opinion of Dr. Thorsteinson on the subject. I myself feel inclined to the same opinion, although Dr. J. Finsen holds a very different view; for, from his nine

years' experience, he says that out of 7539 cases of disease treated by him, 280 were echinococci, or one in 26·9. This, I think, is rather too low, although at present it is, for the want of hospitals, very difficult to obtain any statistical proof on this question. According to the results of many autopsies made here in Reykjavik during the last ten years, hydatids have been found in every sixth body. This, however, is no conclusive proof of the frequency of this chronic malady, for many have died from hydatids who were not examined; although, on the other hand, echinococci have been found in some dead bodies where they were not known to exist during life. Of all the cases treated in our hospital this year, nearly every fifth has been a case of echinococci, either external or internal; and of the many cases treated by myself during the last two years, even more than one-tenth have been echinococci."

Even allowing for the discrepancies in these various estimates, the main fact stands out clearly, viz., that there is in this country a most extensive endemic distribution of this dangerous parasite.

Switzerland.

The disease here appears to be of only occasional occurrence, for in Zurich Lebert found, among two hundred autopsies, no example of echinococcus. In the face of this, it is a remarkable circumstance that, out of thirty-five cases of multilocular ulcerating hydatid collected by Klebs, Marie Prougeansky, and Morin, no fewer than nineteen had been found in Switzerland.

France.

Judging from the great number of Paris graduation theses in which various aspects of this disease are discussed, hydatid disease cannot be very rare in some parts of France; but I know of no statistics bearing upon this point. Davaine ("Traité des Entozoaires," 1877, p. 389) quotes Leudet, who gave it as his experience that hydatids were more common in Rouen than in Paris. Out of nearly two hundred autopsies performed by Leudet at the Surgical Clinique at Rouen, hydatids were present in six cases. During six years of service as *interne* at Paris, a far smaller proportionate number of hydatids came under his notice.

Italy, Spain, and Russia.

The disease is occasionally observed in these places, but no published accounts of its prevalence exist, as far as I have been able to ascertain.

Africa.

As regards our knowledge of disease in it, Africa well deserves its cognomen of "The Dark Continent," for, with rare exceptions, we know nothing of the diseases which devastate its dusky multitudes. The only countries of which we possess some slight information in regard to the occurrence of this disease (hydatid) in the continent of Africa, are Algeria, Egypt, and Cape Colony.

Algeria.

The French military surgeons, serving in this country, have frequently observed hydatids, both in the French soldiers and in the natives of the

land. Dr. Vital met with a dozen instances in the hospital of Constantine.—("Davaine," op. cit., p. 389). Laveran (cited in "Virchow and Hirsch's Jahresbericht," 1885, Vol. II., p. 136), cites four cases of hydatid cysts of the lungs, all of which came from Algeria, where the disease is common, in consequence of the number of dogs which often share the dwellings of their masters.

Egypt.

Bilharz met with three cases of hydatid of the liver in this country.

Cape Colony.

In the official Blue Book for 1884, four cases of hydatid of the liver, and in that for 1885, six cases in the same organ, are recorded as having been treated in the public hospitals of the colony. It may therefore be concluded that it at any rate occasionally appears here.

America.

Davaine remarks that hydatids "are very rare in the United States," and adds that Leidy, in his "Synopsis," mentions but two cases of this kind—one, which occurred in the son of an English sailor, and a second in a Frenchman.

In reply to an enquiry made by me, the Secretary of the National Board of Health, writing under date, Washington, February 13, 1882, reported that the only information respecting hydatid disease in America, procured up to that date, was that supplied by Dr. Morris Longstreth, Physician and Pathologist to the Pennsylvania Hospital, Philadelphia. Dr. Longstreth referred to three specimens in the museum of the Pennsylvania Hospital, all of which came from foreigners; "neither of them had been in our country long, and they spoke the English language very imperfectly."

Dr. W. Osler, formerly of Montreal ("On Echinococcus Disease in America," by William Osler, M.D., M.R.C.P. London, in the *American Journal of the Medical Sciences*, October 1882), has carefully investigated the subject of hydatid disease in America. He states that "in this section of the country it is rarely met with, and in the inspection of over eight hundred bodies, only three instances have been found." From various sources in America, including museums, journals, transactions, and private sources, Dr. Osler has succeeded in collecting sixty-one cases of echinococcus disease; but he remarks, "unfortunately, we cannot say positively how many of these cases were truly American, *i.e.*, originated here, and how many were imported; but in sixteen, it is stated that the patients were European. In the majority, the nationality was not given, but in all probability at least one-third of the cases were imported, leaving only about forty native cases. This immunity may be due either to scarcity of the adult worm, or to the absence of conditions favourable to the infection of man. The tænia echinococcus is certainly a rare parasite. In some scores of dogs, which I have examined during the past fifteen years, I have never met with a specimen, nor do I know of its detection by any American observer." As Dr. Osler remarks, it is probably present in the dogs to a greater extent than might be supposed from the facts just mentioned, for echinococcus cysts are by no means rare in the lower animals in America.

Mexico.

It must occasionally appear in this country, for Semeleder reports in "Virchow and Hirsch's Jahresbericht," for 1880, a case of hydatid of the liver; punctured; died; post-mortem examination.

Asia.

The only Asiatic lands relative to which we possess any information bearing upon the prevalence of hydatid disease, are Ceylon and British India.

Ceylon.

As the result of an enquiry, made in the year 1885, I am able to state on the authority of Dr. W. R. Kynsey, the principal medical officer of the colony, that "there is absolutely no hydatid disease in this country. I have gone carefully over the hospital post-mortem books, and am unable to trace any cases of disease in connection with hydatids, and our post-mortem examinations are most carefully made." During the twenty-two years, 1863 to 1884 inclusive, the number of deaths registered in the colony was 1,109,724, and not one was from echinococcus.

British India—Province of Madras.

Dr. G. T. Thomas has kindly investigated the records of the Madras General Hospital for many years past, and could find only five cases of hydatid disease among the vast number of patients, native and European, that have been treated within its walls; of these, four were Europeans, and one a Hindu. As regards the organs invaded—two were in the liver, two in the lungs, and one in the right ventricle of the heart. One of the "Europeans" was an Australian jockey. Surgeon Sturmer, who had been ten years in Madras, and was also Secretary to the Surgeon-General, had seen only two cases—one in a European woman, the other in a native woman. Dr. Thomas adds, "Hydatid disease is said, by all of the profession, to be very uncommon in the Presidency, or this part of it. The returns from the out-lying dispensaries show hydatids as occurring seldom, if ever; they may, of course, have occurred, and been returned under headings of other diseases." It is curious, that while hydatid disease is so rare in man in this part of India, it is yet common in the domestic herbivora. Thus, James Mills, Esq., Inspector of Cattle Diseases of the Army Veterinary Department, in the Madras Presidency, wrote to me that, "echinococcus veterinorum is most common in Madras; and at the slaughter-houses, the cysts found in the livers of sheep can be counted by hundreds daily; as far as I have seen, they are not so common in cattle."

The Presidency of Bengal.

Here, as in Madras, echinococcus is very rare in man. In the Medical College Hospital, between May 1866 and the end of 1884, there were treated as in-patients, 21,043 male Europeans, but among them, no case of this disease. During the years 1876 to 1884, inclusive, 11,873 male natives were treated, also with no case of hydatids. Finally, out of 13,504 women (native and European) admitted between April 1878 and the end of 1884, only one case of hydatids occurred. In the catalogue of the museum of the Medical College Hospital, Calcutta,

there are four specimens of hydatid of the liver; one only of these died at the hospital—two of these certainly came from Europeans. Dr. D. G. Crawford, to whom I am indebted for much information relative to this subject, in Bengal, also examined the post-mortem books of the Medical College Hospital, with the following results:—Surgical cases from October 8, 1873, to June 26, 1884, 498 cases, no hydatids; medical cases, from September 29, 1873, to January 1, 1885, 1836 cases, with one hydatid—this was in a Hindu male. In another large hospital in Calcutta, viz., the Mayo Native Hospital, during the years 1876 to 1880, inclusive, one case of hydatid of the liver was treated. The Presidency European General Hospital, Calcutta, founded about 1780, contains a little over 200 beds, but returns only one case of hydatid disease.

The North-West Provinces and the Punjaub.

Surgeon-General S. C. Townsend, C.B., reported in 1882, that—"no hydatid diseases have ever been recorded at Amritsar or Peshawur." At Lahore, however, four cases of echinococcus in natives were met with between the years 1863 and 1881. From the Delhi Civil Hospital, Ramkishen (Assistant-Surgeon) reported—"No cases of hydatid cyst have been observed in this hospital, either in the wards, among the out-patients, or in the post-mortem room."

The Bombay Presidency.

Dr. Hatch, Surgeon to the Jamsetjee Jeejeebhoy Hospital, has kindly supplied me with the following facts:—In the hospital referred to, during the years 1875 to 1885, inclusive, 70,254 in-patients were treated, with one case of hydatid disease—in a man, who died after an operation by puncture. In the Goculdas Jeypal Hospital, Bombay, during the years 1874 to 1884, inclusive, 22,873 in-patients were under treatment; among them were two cases of echinococcus disease—one in the liver, the other connected with the bladder.

From the preceding data, it will be seen that throughout the whole of India, echinococcus is rare in man; this is remarkable, inasmuch as the parasite is very common in the domestic herbivora, at any rate, in some parts of India.

Hydatid Diseases in the Colonies of Australasia.

It has long been known that hydatid disease is very common in some parts of Australia, and references have been made to its prevalence by various writers. For instance, so far back as April 1861, Dr. R. F. Hudson remarked that hydatids were becoming common in Melbourne, and he "ventured to predict that hydatids would become of frequent occurrence in Australia." Subsequent experience has proved the soundness of Dr. Hudson's judgment. The principal sources of information here, as in Europe, are the hospital statistics and the bills of mortality.

Victoria.

I am indebted to the kindness of Mr. H. H. Hayter, the Government Statist of Victoria, for a complete record of the number of deaths, registered as due to hydatid disease, for the past twenty-five years. They appear in Table IV. It will be observed, that 901 cases of death from this cause have been registered during the period in question; of

these, 509 occurred in males and 392 in females. The percentage of the total mortality, attributable to echinococcus disease, varied in different years from 0·152 in 1871 to 0·495 in 1879, the average being 0·323. There has been a gradual increase in the number of deaths from this cause. This is well seen, if we compare the five quinquennial periods embraced in the past quarter of a century :—

First	quinquennium	1863-1867	79 cases
Second	,,	1868-1872	116 ,,
Third	,,	1873-1877	191 ,,
Fourth	,,	1878-1882	251 ,,
Fifth	,,	1883-1887	264 ,,
			901 ,,

The increase in the number of deaths registered from hydatid disease, is probably due to several causes, viz.:—(1) The population of the colony has grown rapidly, for example:—

Estimated	population in	1865	621,095
,,	,,	1875	791,399
,,	,,	1885	991,869

But this, alone, cannot explain the increase in the number of deaths attributed to echinococcus, for in the fifth quinquennium there were more than three times as many deaths registered (from this cause) as in the first quinquennium; but the population, meanwhile, had increased only by a little more than one-half. It is evident, therefore, that other causes contribute to increase the number of deaths registered from this disease. (2) Probably the disease is becoming better known, both to the general public and the medical profession; and thus, deaths due to it are more frequently recorded correctly. (3) There is reason to fear that the disease is actually more prevalent than formerly.

As might have been expected, a considerable proportion of the deaths from this cause occurred in the hospitals of the colony. From data courteously supplied by Mr. Hayter, it appears that more than one-third of the deaths from hydatid disease, during the ten years 1872 to 1881 inclusive, took place in the hospitals.

Hospital Statistics.—As the result of an extensive enquiry made in the year 1880 (for details, see "Hydatid Disease, with Special Reference to its Prevalence in Australia," by J. Davies Thomas, M.D., Adelaide, 1884), over 1000 cases were found to have been treated in the hospitals of the colony. Taking the gross results, it was ascertained that about one, out of one hundred and seventy-five of all cases admitted into the Victorian hospitals, was a case of this disease. In the following hospitals, during the period over which their returns extended, there were said to have been no cases of echinococcus treated, viz.:—Belfast, Mansfield, Swan Hill, Maldon, Portland, and Warrnambool. The highest proportion of cases was found in the Alexandra, Wood's Point, Horsham, and Sandhurst Hospitals; but as the three first-named hospitals had only a small number of in-patients under treatment, but little weight can be attached to their apparently high proportion of hydatids. The case, however, is different as regards Sandhurst; where, during the twenty-two years over which the returns extend, there were treated as in-patients 14,058 persons, including one hundred and fourteen cases of hydatid disease, being at the rate of about one to every one hundred and twenty-three in-patients treated.

TABLE IV.—*Table showing the Number of Persons of each Sex that Died in Victoria, from Hydatid Disease, during the Twenty-five Years, 1863 to 1887 inclusive*:—

Year.	Males.	Females.	Total.	Percentage of Total Deaths Caused by Hydatid Disease.
1863	3	2	5	—
1864	6	3	9	—
1865	9	6	15	—
1866	18	7	25	—
1867	13	12	25	—
1868	21	12	33	0·329
1869	12	10	22	0·208
1870	10	7	17	0·164
1871	6	9	15	0·152
1872	24	5	29	0·269
1873	17	12	29	0·253
1874	20	21	41	0·336
1875	25	22	47	0·308
1876	23	13	36	0·266
1877	24	14	38	0·298
1878	17	20	37	0·291
1879	29	31	60	0·495
1880	28	20	48	0·412
1881	30	18	48	0·390
1882	34	24	58	0·42
1883	27	29	56	0·43
1884	29	30	59	0·44
1885	29	18	47	0·33
1886	27	24	51	0·34
1887	28	23	51	0·33
	509	392	901	6·461

The annual average for the twenty years, 1868–87, was 0·323 per cent. of the total deaths.

It would be extremely misleading to conclude that the number of cases of hydatid disease treated in any Victorian hospital really represented the prevalence of the disease in the adjacent part of the country, for owing to the migratory habits of the Australian country population, this could not be the case; a patient treated in Melbourne may have acquired his infection in New South Wales, &c.

New South Wales.

The Under-Secretary, writing under date, Sydney, April 11, 1878, reports that, "No separate classification of hydatid disease was made before the year 1875." During the seven years, 1875-1881, inclusive, fifty-six deaths were registered from this disease, out of a total of 75,565 deaths from all causes. This is at the rate of 0·741 per 1000. More recent returns from this colony, although applied for, have not been received. The hospital returns obtained from twenty-four public institutions prior to the year 1879, show that out of a total of 35,760 in-patients treated, there were ninety-four cases of hydatid disease, being at the rate of one out of every 380·42 persons treated.

Queensland.

From the published returns, it appears that no particulars were supplied as to deaths from hydatid disease prior to the year 1878, but the annexed table shows the deaths registered from this cause from 1878 to 1887, inclusive.

TABLE V.—*Table showing the Number of Deaths Registered from Hydatid Disease in Queensland*:—

YEAR.	MALES.	FEMALES.	TOTAL.	PERCENTAGE OF MORTALITY DUE TO HYDATID DISEASE.
1878	—	2	2	0·05
1879	—	2	—	—
1880	1	—	1	0·03
1881	—	2	2	0·06
1882	2	1	3	0·07
1883	2	2	4	0·08
1884	12	13	25	0·36
1885	11	8	19	0·30
1886	7	2	9	0·16
1887	9	8	17	0·33

It will be noticed, that a remarkable increase has taken place in the deaths from this cause since 1883. That this disease was formerly rare in Queensland is shown, not only by the Registrar-General's returns of deaths, but also by the hospital statistics as far as these were procurable by me. It will be interesting to notice whether the spread of the parasite will continue in this colony.

South Australia.

No deaths from this disease appear to have been registered before the year 1871. It is remarkable, that in different years the number of deaths from this cause has varied greatly in this colony.

TABLE VI.—*Deaths Registered from Hydatid Disease in South Australia*:—

YEAR.	MALES.	FEMALES.	TOTAL.	PERCENTAGE OF THE TOTAL MORTALITY CAUSED BY HYDATIDS.
1871	—	1	1	—
1872	—	—	—	—
1873	1	2	3	—
1874	—	1	1	—
1875	1	1	2	—
1876 } 1877 }	8	3	11	1·61 per 1000
1878 } 1879 }	1	2	3	—
1880 } 1881 }	9	4	13	1·61 ,,
1882	7	5	12	2·73 ,,
1883	6	—	6	0·14 ,,
1884	9	3	12	0·25 ,,
1885	4	1	5	0·12 ,,
1886	8	10	18	0·42 ,,
1887	4	3	9	0·23 ,,

Hospital Statistics.—The principal hospitals in the colony are the Adelaide Hospital, and that at Mount Gambier.

At the Adelaide Hospital there were treated, during the thirty-six years, 1852-1887, inclusive, 293 cases of hydatid disease among 48,716 in-patients, or at the rate of one out of 166 in-patients treated. During the last few years, there has been a notable increase in the proportion of cases of this disease treated in this hospital. For example—the average proportion of hydatids among the in-patients for the thirty-one years preceding 1883, was one out of 222 in-patients; it has now risen to an average of one in 166 during the last thirty-six years. During the five years, 1873 to 1877, inclusive, there were seventy cases admitted; from 1878 to 1882, inclusive, there were seventy-four cases; but during the last five years, 1883 to 1887, inclusive, the number rose to 118. This is not due to any increase in the number of in-patients treated; on the contrary, there has been an actual diminution in their number.

Western Australia.

In March 1878, the Colonial Secretary wrote that he regretted his inability to supply information as to deaths from hydatid disease, because—"Under the Registration Act of this Colony, it is not compulsory on individuals registering deaths to produce the certificate of a professional man; consequently, causes of death in most instances are recorded in general terms." The Colonial Surgeon also reported—"That no cases of death have occurred in Western Australia from the disease in question during the period from 1878 to October 1882, the few cases that have been brought under his notice having all been successfully treated."

New Zealand.

The returns of the causes of death were not compiled by the Registrar-General's Department prior to the year 1873. The number of deaths registered from hydatids from 1878 to 1887, inclusive, appear in the table appended.

TABLE VII.—*Deaths from Hydatid Disease in New Zealand*:—

YEAR.	MALES.	FEMALES.	TOTAL.	PERCENTAGE OF TOTAL MORTALITY DUE TO HYDATID DISEASE.
1878	2	4	6	0·129
1879	4	3	7	0·125
1880	3	6	9	0·165
1881	—	3	3	0·055
1882	5	2	7	0·123
1883	—	1	1	0·0165
1884	2	1	3	0·0522
1885	1	2	3	0·0493
1886	3	1	4	0·0652
1887	—	2	2	0·0325
In ten years ..	20	25	45	

It will be seen that the disease is not common in this Colony. This is also borne out by the hospital statistics.

Tasmania.

Here, as in New Zealand, the disease is not frequently met with. This is evident from the record of the registered deaths.

TABLE VIII.—*Deaths from Hydatid Disease in Tasmania*:—

YEAR.	MALES.	FEMALES.	TOTAL.	PERCENTAGE OF TOTAL MORTALITY DUE TO HYDATID DISEASE.
1878	2	—	2	0·1176
1879	1	1	2	0·1185
1880	1	—	1	0·0546
1881	—	1	1	0·0577
1882	2	2	4	0·209
1883	4	—	4	0·188
1884	2	4	6	0·3015
1885	1	1	2	0·0982
1886	—	2	2	0·1062
1887	1	2	3	0·1388
In ten years ..	14	13	27	

AGE IN RELATION TO HYDATID DISEASE.

No age is necessarily exempt from echinococcus disease, for whenever the ripe eggs of the proper tape-worm are swallowed, infection will follow. But the chances of infection of infants and of young children are small. A sucking babe is very unlikely to receive infection in any way, and yet Cruveilhier mentions the case of a child, aged twelve days, that appeared to have a hydatid cyst; but in this instance, there were strong reasons for doubting whether the observation was correct. I have, however, recorded (*Australian Medical Journal*, October 15, 1882, page 438) the case of a boy, aged two years and one month, in whom I operated upon a hydatid cyst of the liver Old age gives no exemption, for Monod met with a case in which the patient was seventy-seven years old, and Charcot saw a hydatid in the phalanx of the index-finger of a man eighty-one years of age.

From the natural history of the disease, it is evident that, other things being equal, the longer a person lives, the greater are his chances of becoming infected with echinococcus; but on the other hand, with advancing age, there are fewer persons left alive to take the disease. It must also be remembered that the parasite requires usually a considerable time to make its presence known in the body of its host. Probably, on an average, five or six years pass between the moment when the egg is swallowed up to the time when the great size of the bladder-worm, or the accidents caused by its rupture, &c., betray its presence. In consequence of these various conditions, we find that the frequency of the disease increases with each decade of life up to about thirty or forty years of age; it afterwards declines, so that after sixty it is not common.

The age distribution of the disease is shown in the accompanying table, based on 1301 cases collected by me from various parts of the world.

TABLE IX.—*Table showing the Distribution, according to Age, of* 1301 *Cases of Echinococcus Disease, collected from various parts of the World*:—

AGE.	NUMBER OF CASES.	PERCENTAGE.
1 to 10 years old	91	7·00
11 to 20 ,, ,,	222	17·06
21 to 30 ,, ,,	376	28·90
31 to 40 ,, ,,	299	22·98
41 to 50 ,, ,,	171	13·14
51 to 60 ,, ,,	108	8·30
61 to 70 ,, ,,	34	2·62
	1301	100·00

With minor and probably, in a certain sense, accidental exceptions, this age distribution prevails in the case of all the organs of the body excepting the brain, in which the highest mortality from echinococcus occurs in the second decade of life.

SEX IN RELATION TO HYDATID DISEASE.

There seems, *a priori*, to exist no valid reason why, throughout the world generally, the two sexes should suffer in unequal proportion from this disease, and indeed Davaine ("Traité des Entozoaires," second edition, page 387), and other writers on the subject have usually failed to discover any such difference. If in a given country one sex suffers more frequently than the other, this may be due to one or both of the following causes, viz.:—(1) The two sexes may form unequal proportions of the community; or (2) The occupations and habits of the men and women may expose them unequally to the chance of infection.

As regards the former of these factors, the numbers of the two sexes living do not differ greatly, at any rate in the case of the principal races of the civilized world. If we take the principal nations of Europe as a whole, the sexes stand thus in the population:—Males, 48·5 per cent.; females, 51·5 per cent. But with regard to the liability to echinococcus disease in Europe as a whole, I find, from 1152 published cases, that the numbers of each sex stand thus:—Males 586, or 50·86 per cent.; females 566, or 49·14 per cent. So that in Europe in general, although the living females outnumber the males, yet rather more males than females acquire hydatid disease.

In England and Wales, however, according to the Mortality Returns of the Registrar-General, out of 527 deaths attributed to hydatids, there were—Males 243, or 46·11 per cent.; females 284, or 53·87 per cent. In England, then, there is a slight but distinct preponderance of females attacked.

In Iceland, this attains a still more marked degree; for it is generally admitted by physicians practising in this land, that women here are far more often the victims of the disease, than men. Finsen even states the ratio to be as high as two and a half women to one man. This is not to be explained by a great preponderance of females in the Icelandic population, because from data derived from Burton ("Ultima Thule, or

a Summer in Iceland," by Richard F. Burton), I find the proportions of the sexes in Iceland to be—Males, 47·49 per cent.; females, 53·51 per cent. The cause of the preponderance of females among the sufferers from this disease in Iceland, is probably correctly stated by Finsen to be, that the domestic avocations of the women which occupy them in cooking and in washing kitchen utensils, &c., render them more liable to swallow the eggs of Tænia echinococcus than men are; this especially, in consequence of the Icelandic dogs being allowed to lick the vessels employed in the kitchens.

That this explanation is correct, is rendered probable by cases the reverse of this, viz., in Mecklenburg, where, according to many writers, *e.g.*, Madelung ("Beiträge Mecklenburgischer Aerzte zur Lehre von der Echinococcen-Krankheit," Madelung, Stuttgart, 1885), hydatid disease presents itself with unusual frequency, the ratio in which the sexes are attacked is as follows:—Males 106, or 54·36 per cent.; females 89, or 45·64 per cent.

In the Australasian colonies as a whole, inclusive of New Zealand and Tasmania, the returns of deaths registered as due to this disease show a very decided preponderance of males, viz.:—Males 55·86, females 45·14 per cent. (see Table X.) In New Zealand only was there a majority of females. The proportion of the two sexes in the total population has varied greatly from time to time in the Australasian colonies, for in the early days of their colonisation, many more men than women became immigrants. In consequence of this, the average ratio of the sexes in Victoria during the twenty years commencing with 1861 appears to have been—Males, 100; females, 74. More recent enquiries based upon Mr. Hayter's valuable returns ("Victorian Year Book," 1885-86, pages 44 and 45), give the following as the approximate ratios of the sexes in the Australasian colonies as a whole:—Males 54·18, females 45·81 per cent. From these data, it may be concluded that the sexes are attacked by this disease in about the same proportion as they occur in the total population, viz., about five males to four females.

TABLE X.—*Table showing the Number of Persons of each Sex that Died of Hydatid Disease in the Australasian Colonies during the undermentioned periods. Compiled from official sources*:—

Name of Colony.	Period.	Males.	Females.	Total.
Victoria	1862–87	512	394	906
New South Wales	1875–81	29	27	56
Queensland ..	1878–87	44	38	82
South Australia ..	1871–87	58	38	96
New Zealand ..	1878–87	20	25	45
Tasmania ..	1878–87	14	13	27
		677	535	1212

THE SURGICAL TREATMENT OF HYDATID DISEASE.

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The invitation to open the discussion on the Surgical Treatment of Hydatid Disease was given to me, when in Melbourne, by our esteemed President, and so right loyally did Melbourne medical men support us in our first attempt at a Congress, both by their presence and by valuable contributions, that I felt no course was open to me but to accept gratefully the honour, and do my best, fully conscious, however, that I should only be able to give the subject scant justice, and touch lightly only on the various aspects of the question. My aim will be to place the subject before you in such a way as to enable you during the ensuing discussion to keep strictly to the question of treatment, and thus we shall be able to extract from those of you who have had large experience in the treatment of the disease, results of your various methods which, when summed up and critically analysed, will render it possible to arrive at some conclusions which may serve as guides to Australian practitioners generally; and may also be the means of authoritatively informing practitioners at Home of our opinions which, owing to our infrequent contributions to the literature of the subject, they have so far been unable to learn, and which has led up to the erroneous statement of our views by a member of the Clinical Society of London, at its meeting held in December 1887. The following quotation from the Report of the Clinical Society, in the *British Medical Journal* of December 17th, 1887, shows clearly the error to which I have referred :—"Mr. Godlee called attention to the different treatment adopted for these cases in Australia and in this country. There, aspiration was employed, and a cure usually effected; if not, the surgeon then pushed a trocar and canula through the abdominal wall, and so drained the cyst usually to its cure. Here, surgeons cut down to the cyst, which being done, the question arose whether the cyst should then be at once opened, or should it be first attached to the external skin opening, and then opened subsequently. His plan was to tap the cyst, and then stitch the cyst wall to the cutaneous wall." This paper will show that our practice for a number of years has been identical with that laid down by Mr. Godlee as the treatment pursued in Great Britain.

The plan which I shall adopt in this paper is to describe :—

I.—All the various surgical methods employed in the treatment of hydatids.

II.—To compile from various sources, and place before you statistics, showing the results of the various methods of treatment.

III.—Lastly, I shall lay before you shortly my own views, and the methods which I at present adopt, and the results which I have obtained during the last four years, *i.e.*, since I made a distinct departure from my former methods.

Part I.—The Various Methods of Surgical Treatment.

(1) Aspiration or tapping with fine trocar and canula, with or without the injection into the cyst of iodine, bile, &c.

(2) Electrolysis.

(3) Introduction and retention of large trocar and canula. Of this, there are four subdivisions:—

- (*a*) Insertion of a circle of needles to procure adhesions between visceral and parietal layers of the peritoneum.
- (*b*) Incision down to the peritoneum with the knife.
- (*c*) Use of potassa fusa to procure adhesions prior to opening the cyst.
- (*d*) Immediate introduction and retention.

(4) Abdominal and thoracic section, allowing membranes to be expelled spontaneously. Of this, there are two subdivisions:—

- (*a*) The insertion of Chassaignac's rubber tube, with immediate stitching of the cyst wall to the abdominal wall in the abdominal cases.
- (*b*) The same treatment, with a preliminary operation some days before, to secure adhesion between the visceral and parietal layers of the pleura, and of the peritoneum.

(5) Abdominal and thoracic section, associated with the immediate removal of the whole or the bulk of the cysts, by douching with boric acid lotion, and the use of long holding-forceps; and finally, the insertion of a rubber tube. Of this, there are two subdivisions:—

- (*a*) With immediate stitching of the cyst wall to the abdominal wall in the abdominal cases.
- (*b*) With a preliminary operation some days before, to secure adhesion between the visceral and parietal layers of the pleura, and of the peritoneum.

Part II.—Statistics of the Various Methods of Treatment.

Reliable statistics of the first two methods, viz., aspiration and electrolysis, are absolutely impossible to obtain, on account of the fact that in the great majority of the cases, the surgeon loses sight of the patient; and possibly also, because in a vast number of cases, the sufferer, finding that his cyst has re-filled, seeks other advice. The surgeon who is then consulted, finding that aspiration has been tried and failed to cure, advises and carries out an abdominal or thoracic section. It cannot be doubted, also, that aspiration, especially in pulmonary hydatids, is a form of treatment not free from danger, as in forty-three cases of hydatid disease occurring in the Adelaide Hospital during the last four years, two are entered as deaths after aspiration of lung hydatids.

I have collected eight published cases of death following aspiration, performed by Australian surgeons between 1878 and 1888, so that the operation is not free from risk. Cases, however, are on record, which have been watched for years, and prove conclusively that aspiration is occasionally really successful. It is, however, decidedly unreliable, and I have given it up completely, except as a diagnostic aid at the time of performing a radical operation.

There is also before me a table of thirteen cases of treatment by electrolysis, of which one failed and one died, leaving a total of eleven recoveries in thirteen cases, or a percentage of 15·38 of deaths. This number is, obviously, of no value in discussing comparative results.

Dr. Davies Thomas has collected from various sources eighty-four cases of treatment by caustics, with fifty-nine recoveries and twenty-five deaths. The treatment in most of the cases was complicated by the introduction of several methods, in addition to Récamier's caustic method. They serve to demonstrate the terrible mortality which attend such procedures, viz., 29·76 per cent. of deaths.

In 1885 I made a collection of Australian statistics of radical operations for abdominal and lung hydatids, by various surgeons, and I have now slightly added to it. They number forty-six, with eight deaths, giving a death-rate of 17·39 per cent.

I also submit a list of internal hydatids treated in the Adelaide Hospital, from January 1, 1885, to the end of 1888. Seven cases of liver hydatid were treated with retained canula, with two deaths, or a death-rate of 28·57 per cent. Thirty-five cases were treated by section, with the following results:—

Liver	23	..	Deaths	5	..	Cures	18
Lung	4	..	,,	—	..	,,	4
Omentum	4	..	,,	1	..	,,	3
Pleura	3	..	,,	—	..	,,	3
Kidney	1	..	,,	—	..	,,	1
	35			6			29

That is a death-rate for section of 17·14 per cent., or on the whole forty-two cases, a death-rate of 19·04 per cent.

In another table at the close of this paper is a collection of thirty-two cases of section occurring in my own practice, from January 1, 1885, to the end of 1888, showing 100 per cent. of recoveries in the thoracic sections, and a mortality of 6·25 per cent. in the thirty-two sections.

Dr. Davies Thomas has collated the deaths and recoveries in ninety cases of hydatids treated by retained canula. The percentage of deaths is 26·66 per cent., and cures 64 per cent., the balance consisting of cases in which the result was doubtful.

Part III.

In the beginning of 1885, a case of hydatid of the liver occurred in my practice, which, terminating fatally from septicæmia, led me to the conclusion that danger was to be expected from allowing the cysts to be spontaneously expelled, or from removing them gradually with the forceps.

The case was shortly as follows:—

Mrs. B. consulted me for a pain in the right side of the chest, in front. Lungs and heart were found normal on examination. There was no bulging in the region of the liver, and the lower edge was not lower than usual. The upper border on percussion was found normal in position, but there was an extension of dulness upwards at one point in the line, semi-circular in shape, and having a radius of about two inches. I determined to explore this with the aspirator, but on inserting the needle, no fluid came away, and I was forced to the conclusion that I had made a mistake; but on reaching home I luckily blew through the needle on to a glass slide, and under the microscope discovered about twenty separate hooklets. I then removed subsequently part of a rib,

and incised the cyst, inserting a rubber tube. Very little came out at the operation, the mother cyst being absolutely packed tight with daughter cysts.

I left the Colony at the time for my annual holiday, and the case was attended by my friend, the late Dr. Chas. Gosse, who, following the practice of that time, drew out the cysts as they appeared in the drainage-tube. Had there been an opening made in the back, and the whole of the contents washed out early in the case, I feel sure the result would have been different.

This led me to formulate for myself the following rule, viz., to remove all cysts contained in the external envelope at the time of operation. Since that date, my practice has invariably been not to use the aspirator except at the time of operation, and then only to make sure of the best point to attack the cyst.

The operation consists, then, in the thorax, of resecting parts of two or more ribs, then incising the pleura, cutting through the visceral pleura into the lung, and then removing the membranes thoroughly.

In the abdomen, I cut down on the most prominent part of the cyst, and if the cyst wall will hold stitches, I place a circle of stitches uniting the cyst wall to the parietal peritoneum. Then my assistant presses with a circle of sponges the abdominal wall against the cyst, and, with a sharp-pointed knife, the cyst is boldly opened for about one inch. As soon as the knife is removed, the finger enters, and large curved needles are then passed through the cyst and the abdominal wall, at first at four points, and then a few secondary sutures in between. As soon as this is finished, the cyst is distended with boric lotion, and as the current returns, the membranes are gradually extruded, the exit of the mother-cyst being aided with ovum- or other suitable holding-forceps. A soft rubber tube is then inserted, and over all a dressing of carbolised gauze, followed by salicylic wool, and finally, by a large pad of oakum enclosed in carbolised gauze. The cyst is then washed out daily, in abdominal cases. In thoracic cases, douching frequently sets up violent coughing, and if so, has to be very little used, or given up altogether. In two of my lung cases, I have had an empyema form, compelling me to resect a rib and drain from the lowest point of the pleura. To obviate this in future, I intend to resect pieces of several ribs to give plenty of room, and then endeavour to unite the visceral to the parietal pleura, immediately before cutting into the cyst.

The table which is here introduced, contains all my sections for hydatid during the last four years into the abdomen and thorax, and in each case, except that of Mrs. B., all the cyst, or at least the greater bulk of it, was removed at the time of operation, only small fragments appearing afterwards. The results are as follow :—

THORACIC SECTIONS	9	..	Cures 9	..	Deaths —
ABDOMINAL SECTIONS—					
Liver ..	20	..	,, 19	..	,, 1
Broad Ligament	1	..	,, 1	..	,, —
Kidney ..	1	..	,, 1	..	,, —
Omentum ..	1	..	,, —	..	,, 1
Totals ..	32	..	,, 30	..	,, 2

Or a mortality of 6·25 per cent. in thirty-two operations.

No.	Name.	Sex.	Date.	Situation.	Anæsthetic Used.	Result.	Remarks.
1	Miss B.	F.	8/1/85	Hydatid of Liver.	Ether.	Cured.	Cyst from lower edge of Liver.
2	Mrs. B.	F	6/3/85	Hydatid of Liver.	Ether.	Died.	There was no bulging in this case, but the upper margin of the liver dulness extended upwards at one point in a horse-shoe shape, having a vertical radius of two inches. The aspirating needle was introduced; nothing came out. The contents of the needle were blown on to a slide, and under the microscope, numerous hooklets were discovered. Resection of ribs, and a large drainge tube introduced. Death occurred from septicæmia.
3	Mrs. McG.	F.	5/8/85	Hydatid of Lung.	Ether.	Cured.	Resection of ribs; removal of cyst from right mammary region.
4	Miss S.	F.	15/9/85	Hydatid of the Broad Ligament.	Ether.	Cured.	Operated on two years before for hydatid of liver.
5	A. C.	F.	21/1/86	Pedunculated Hydatid of Liver.	Ether.	Cured.	Mistaken for an ovarian cyst.
6	Mrs. McC.	F	2/3/86	Omentum.	Ether.	Died of Perit'tis.	Two cysts removed.
7	Mr. D.	M.	17/7/86	Hydatid of Liver.	Ether.	Cured.	Two cysts in the liver operated upon.
8	D. M.	F.	30/9/86	Hydatid of Liver.	Ether.	Cured.	—
9	F. G.	M.	18/11/86	Hydatid of Lung.	Ether.	Cured.	Opened between ribs.
10	T. N.	M.	3/3/87	Hydatid of Liver.	Ether.	Cured.	—
11	A. C.	F.	25/5/87	Hydatid of Liver.	Ether.	Cured.	—

No.	Name.	Sex.	Date.	Situation.	Anæsthetic Used.	Result.	Remarks.
12	J. H.	F.	22/6/87	Hydatid of Liver.	Ether.	Cured.	——
13	T. S.	M.	28/9/87	Hydatid of Liver.	Ether.	Cured.	——
14	Master G.	M.	3/11/87	Hydatid of Liver.	Ether.	Cured.	Deeply jaundiced; no bulging.
15	C. D.	F.	2/12/87	Hydatid of Liver.	Ether.	Cured.	Cyst removed at operation.
16	D. M.	F.	16/12/87	Hydatid of Kidney.	Ether.	Cured.	Growing from outer side of the capsule.
17	Mr. H.	M	17/12/87	Hydatid of Liver.	Ether.	Cured.	Three ribs excised, and six hydatid cysts removed.
18	Master L.	M.	23/12/87	Hydatid of Liver.	Ether.	Cured.	Ascites present and tapped, then abdominal section, and at point of incision intestine found adherent to capsule of the liver. Opened at another place and margins of cyst sewn to edges of the wound; cyst removed entire.
19	Miss R.	F.	30/12/87	Hydatid of Liver.	Ether.	Cured.	Eighth and ninth ribs resected, and two separate cysts removed.
20	Mrs. H.	F.	25/1/88	Hydatid of Liver.	Ether.	Cured.	Liver substance incised to a depth of three inches before reaching the cyst, which was then removed entire.
21	L. M.	F.	7/3/88	Hydatid of Liver.	Ether.	Cured.	Resection of rib and insertion of large drainage tube, with immediate removal of the cyst.
22	E. F.	M.	7/3/88	Hydatid of Liver.	Ether.	Cured.	Two large cysts removed
23	M. G.	F.	12/3/88	Hydatid of Lung.	Ether.	Cured.	Two ribs excised.
24	G. H.	M.	1/5/88	Hydatid of Liver.	Chl'fo'm.	Cured.	Two ribs resected.
25	A. G.	F.	27/6/88	Hydatid of Lung.	Ether.	Cured.	Resection of ribs.

No.	Name.	Sex.	Date.	Situation.	Anæsthetic Used.	Result.	Remarks.
26	Mrs. D.	F.	8/8/88	Hydatid of Liver.	Ether.	Cured.	Cyst removed at time of operation.
27	Mr. B.	M.	30/9/88	Hydatid of Lung and Muscles of Back.	Ether.	Cured.	Removal of part of third rib in front; the removal of rib in axillary region; large drainage tube passed right through and cyst removed. Symptoms not relieved, and examination by the finger revealed a very large cyst in the back, removed through anterior opening. Resection of rib below the scapula, and drainage of an empyema. Necrosis of ribs from pressure of hydatid. Estlander's operation, removing ribs and pleura.
28	Miss G.		3/10/88	Hydatid of Lung.	Ether.	Cured.	—
29	B. C.	M.	13/10/88	Hydatid of Lung.	Ether.	Cured.	Removed from lung through an axillary opening.
30	Miss R.	F.	27/10/28	Hydatid of Liver.	Ether.	Cured.	Large cyst of left lobe of liver stretching up to the diaphragm; all cysts removed at time of operation.
31	Mr. C.	M.	1/11/88	Hydatid of Lung.	Ether.	Cured.	Situated in base of left lung; two inches of rib removed, and the contents of the cyst washed out.
32	Miss R.	F.	23/11/88	Hydatid of Lung.	Ether.	Cured.	Excision of parts of three ribs.

THE OPERATIVE TREATMENT OF ECHINOCOCCUS CYSTS.

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Part I.

(*a*) Operations by puncture.

(*b*) The treatment of echinococcus cysts by means of medicated injections.

(*c*) The treatment of hydatid cysts by electricity.

Part II.—*Radical Operations.*

(*a*) Treatment by caustics (Recamier's method).

(*b*) Treatment by canule-à-demeure.

(*c*) Various forms of incision operations.

Perhaps among the diseases which afflict mankind, there is none for the relief of which a greater diversity of treatment has been practised, than "hydatid" disease. But varied as are the surgical procedures which have been followed for this object, they yet may be classified, for the purposes of criticism, under three headings, viz. :—

I.—Those by which it is intended that the parasite shall be destroyed, without, however, aiming at its entire removal from the body of its "host." To this group belong—

(*a*) Operations of puncture or "tapping"—aspiratory or simple—by which the fluid contents of the bladder-worm are removed to a greater or less extent.

(*b*) The injection through a canula, previously inserted, of various bodies supposed to act as parasiticides.

(*c*) The destruction of the parasite by electricity.

II.—Those operations, which have as their object the extraction of the entire bladder-worm, with any daughter-cysts that may be present; such operations may be regarded as radical operations. To this class belong cases in which the parasite is removed by an artificial opening into its sac, procured by—

(*a*) Caustics.

(*b*) Canule-à-demeure.

(*c*) The varied forms of incision operations.

III.—A third group of operations is constituted by a comparatively few recorded cases, where not only has the parasite been removed, but also, more or less completely, its fibrous sac as well. These operations may be regarded as "ultra-radical," in consequence both of their greater gravity, and of the limited number of cases in which they can be regarded as permissible.

Before proceeding to the discussion of the claims of the different modes of treatment, it is desirable to consider briefly the nature of the conditions present. In its normal state, the echinococcus cyst lies imbedded in some organ, tissue, or "closed cavity" of its host; almost invariably it is completely enveloped in an adventitious sac, or capsule,

which is not an integral part of the parasite, but is a morbid product of the organ or tissue in which the bladder-worm has taken up its abode; it is, nevertheless, a structure of great importance to the parasite, for through it, by a process of diosmosis, the latter obtains its supply of pabulum from the blood of its host; its functional integrity therefore determines whether the parasite shall dwell in plenty, or die of inanition. When the parasite, and consequently also its fibrous sac, is young, the latter is very richly supplied with blood-vessels, which are derived from the neighbouring normal vessels; consequently, the removal of the fibrous sac of necessity entails a very abundant employment of ligatures. But from the very nature of the fibrous capsule, which consists of stratified layers of connective tissue, it tends to contract, and in doing so, to impair its own vascular supply; hence follow extreme induration and rigidity of the capsule, and calcareous degeneration. This process may issue in complete calcification of the entire sac, if it be of small size, but in the case of large cysts, the process is more or less localised; some portions of its surface being thick, tough, and often infiltrated with calcareous salts, whilst others are much less indurated and rigid. Calcareous degeneration, here as elsewhere, is a necrotic change, and is in this case an indication of impaired blood supply. The effect of this alteration upon the enclosed parasite is, when it has reached an extreme degree, fatal, by cutting off its supply of pabulum. When the parasite dies from this cause, as is frequently the case, its fluid contents become more or less opaque, the scolices die and disintegrate, a putty-like matter is found between the parasite and its capsule, and ultimately nothing remains except a tough sac much contracted in size, within which are found a putty-like mass, with the remains, if any, of the mother-cyst, variously folded and plaited in a manner resembling the æstivation of certain plants. It is important, clinically speaking, to recognise that the mere death of the parasite does not of necessity mean the cure of the host; for it is quite common to meet with hydatids requiring operation, but in which the parasite is dead and far advanced in spontaneous decay.

In estimating the results of different plans of treatment, several conditions have to be regarded, viz:—

(1) *The locality of the parasite.*—It is evident that an echinococcus cyst in the female breast may be safely removed, without removal of the mamma itself; whilst a colony of hydatids in the interior of the thigh bone may entail amputation of the hip joint, and so may kill the host indirectly.—(Case recorded by Kanzow and Virchow, and cited in "Virchow and Hirsch's Jahresbericht," Vol. XV., Part 1, page 341.) Then the cyst may be so placed as to render diagnosis, and consequently treatment, impossible—for example, in the walls of the heart, in the interior of the brain, &c. Speaking generally, the most important cases of hydatid disease, on account of their relative frequency, are those of the interior of the thorax and abdomen, and more particularly those of the liver and lungs. About 72 per cent. of all cases of echinococcus disease in man occur in connection with the abdominal cavity; but as regards individual organs, the liver is most frequently invaded (in 57 per cent.), and the lungs next (in nearly 12 per cent.) Even in the case of the different organs situated in the same cavity, the special local conditions exert a great influence both upon the prognosis and treatment. For example, echinococci of

the pericardium and heart must, for the present at least, be regarded as alike beyond the reach of diagnosis and of treatment. Echinococci of the lung are greatly affected in their career by the frequency of their rupture into the bronchial tracts. Many cases of this disease in the lungs are spontaneously cured by the elimination of the parasite through the air-passages; and, moreover, a considerable proportion of the cases of pulmonary hydatids, reputedly "cured" by tapping operations, really have recovered in consequence of the expulsion of the remains of the parasite by coughing, although the bladder-worm was killed by the puncture. Moreover, in the case of pulmonary hydatids which have ruptured either spontaneously or in consequence of surgical interference, it frequently happens that bacteria are conveyed by the air entering the cavity, through the bronchial tubes which open into it, and thus putrefactive changes are induced in the contents of the sac. From this cause, pyrexia, cough, night sweats and emaciation may arise, and the patient often presents the precise general aspect of a phthisical sufferer. In hydatids of the liver and kidney also, the existence of the natural ducts of these organs often occasions special accidents to befall them. In the case of liver cysts, bile may enter into the sac after the mother-cyst has ruptured, and the remains of the parasite or any daughter-cysts present may pass into or through the bile ducts, or may be arrested in them and cause jaundice. Hydatids of the kidney are particularly liable to rupture spontaneously into the pelvis of the organ, or into some other part of the urinary ducts, for more than two-thirds of the cases collected by Beraud (Beraud's "Des Hydatides des Reins," Paris Thesis, 1861, page 47) terminated in this way. On the other hand, the spleen, omentum, mesentery, and the abdominal cavity, which often are the seats of echinococcus cysts, have no natural channels which can serve as outlets for the parasite.

(2.) *The age of the parasite.*—With advancing age the fibrous capsule becomes thicker, more rigid, and tends to undergo calcareous degeneration: it also acquires more extensive and closer connection with the adjacent structures, and in consequence, it collapses less readily when its contents are removed. I have seen a case of hydatid cyst which projected from the under surface of the liver, and which extended deep into the recto-vesical pouch, where the fibrous capsule was so closely adherent to both the anterior and posterior walls of the abdomen, that it was a puzzle to discover where the intestines were placed. It is evident that, under such circumstances, much delay must occur in the process of obliteration of the cavity formerly filled with the bladder-worm, for usually the sac yields to the pressure of the stomach, intestines, &c., and thus its opposed walls come in contact, and are soon united by membranous adhesions. Again, when the fibrous capsule is extensively degenerated, it may become detached in larger or smaller portions during the process of cure; this is especially apt to occur where the sac has undergone calcareous degeneration.

(3.) The occurrence of suppuration in the sac, or of putrefactive changes in its contents, with or without the accumulation of gas, exert a weighty influence upon the prognosis and proper treatment. Usually, such conditions render a radical operation imperatively necessary.

In this essay, I propose to briefly review the modes of treatment more commonly adopted for the relief of hydatid disease, especially as concerns

their efficacy and their danger to life; but, as I have elsewhere recently discussed (*Australian Medical Journal*, 1888) at length many of the plans of treatment, I shall here only refer to the conclusions arrived at with regard to the following methods, viz., punctures, injections, electricity, caustics, and canule-à-demeure. It is intended, however, that the more modern methods of incision, according to the modifications of Simon, Volkmann, and Lindemann, shall receive fuller consideration.

(*a*) Operations by Puncture, either Aspiratory, or by Means of a Simple Trochar and Canula.

Tapping, at first with a common trochar of small calibre, and, after its introduction by Dieulafoy, by the aspirator and fine canula, has been a favourite mode of treatment in most parts of the world where hydatid disease is met with. In has been strongly advocated by Murchison in England, by Boinet and Dieulafoy in France, by Hjaltalin in Iceland, and by Hudson, MacGillivray, Bird, and others in Australia.

Until quite recently in Australia, puncture has been the recognised regular mode of treatment for all cases of internal hydatids. This fact alone should be proof that sometimes cure results from tapping operations; but on the other hand, it is certain that in a large proportion of cases, it fails to rescue the patient from death. It must also be conceded that the treatment by puncture is attractive from its simplicity, and its apparent freedom from risk: moreover, if we accept without criticism the statements of many of its advocates, it might be concluded that failure to cure by it is exceptional. But a closer scrutiny brings with it much scepticism, for the statistical data based upon the number of reputed "cures" by tapping operations are in the last degree unsatisfactory, inasmuch as it is certain that in many of them the cyst re-fills, and becomes a source of peril to the patient. Such an occurrence has been known to take place even as long as ten years after the patient was believed to have been cured; indeed, it is almost impossible to fix a time at which an hydatid cyst, treated by puncture, may safely be said to be cured. It follows, therefore, that in statistics bearing upon this question, the number of reputed cures must be accepted with very large reservation.

Simple and harmless as puncture with a small trochar generally is, yet it not unfrequently happens that alarming symptoms follow it, and in a few cases death has even taken place. I have elsewhere (*Australian Medical Journal*, April 1888) referred to three cases in which death occurred immediately after puncture of hydatid cysts in the liver, apparently from shock. I have also seen a patient in imminent danger for hours from shock, after a puncture of a hydatid cyst of the spleen, although a very fine needle was used (*Australasian Medical Gazette*, June 1887). The pathogeny of such cases is obscure at present.

In the case of pulmonary hydatids also, death has been known to supervene rapidly after puncture. In two cases kindly communicated to me by Dr. Lonsdale Holden, of Hobart, the patients died, one in about five minutes, the other in about half an hour after puncture with a fine trochar. Dr. Holden was inclined to regard these as deaths from syncope. It seems to me however that, at any rate, in some cases of sudden death after the puncture of large pulmonary cysts, the patient has really died of suffocation, in consequence of the flooding of the

bronchial tracts of both lungs by the outflow of hydatid fluid from the punctured cyst. That this accident is not more frequent under these circumstances is probably attributable to the fact that the collapsed mother-cyst often occludes the openings of the bronchial tubes on the walls of the cavity. (For a discussion of this point, see "Hydatid Disease of the Lungs," Proceedings of the South Australian Branch of the British Medical Association, September 1884.)

In a case recorded by Schede (cited in Madelung, "Beiträge Mecklenburgischer Ærzte zur Lehre von der Echinococcen-Krankheit," Stuttgart, 1885, p. 86), a woman, aged twenty-three, died from suffocation in the course of a few minutes after an exploratory puncture of a huge hydatid of the right lung.

I have witnessed most urgent dyspnœa from the same cause. When an echinococcus cyst of the kidney is punctured, its contents may escape by the ureter into the bladder, and so become eliminated, as in a case related by Bradbury (*British Medical Journal*, October 6, 1887, p. 471). In the case of liver cysts, escape of the parasite by the bile ducts after puncture is not very common, probably in consequence of the comparatively small size of the intra-hepatic ducts; jaundice from their blockage is probably more often met with. There is good reason for believing that a large proportion of the cases of lung hydatids cured after puncture recover simply in consequence of the expectoration of the membranes, although it is true that the puncture killed the bladder-worm, and so rendered possible its expulsion by coughing.

The recorded deaths after the puncture of pulmonary hydatids appear to me to be of sufficient interest and importance to merit notice in this paper; they are fully recorded in a table published in the *Australian Medical Journal*, of July 1889. In four cases, death seems to have resulted from rupture into the pleural cavity. In one, death was apparently due chiefly to a cyst of the liver that was also present. In four instances, death took place very soon after puncture; one them admittedly died from suffocation, the others possibly from the same cause, or from shock. The remaining cases sank from dyspnœa, pyrexia, and exhaustion.

TABLE I.—*Table showing the Results of Tapping Operations upon Echinococcus Cysts in various Parts of the Body*:—

Situation of Cyst.	Deaths.	Not Relieved.	Failure of Puncture (other operations).	Relieved.	Reputed Cures.	Result Unknown.	Total.
Liver	73	5	92	68	168	10	411
Lung	14	—	20	1	14	4	53
Spleen ..	2	—	7	4	6	1	20
Kidney ..	—	—	4	—	2	—	6
Omentum, mesentery, &c...	1	—	3	—	3	—	7
"Abdomen"..	1	—	1	5	1	2	10
Male Pelvis ..	4*	—	4	—	5†	—	13
Total ..	95	5	131	73	199	17	520

* Once the bladder as well as the cyst was punctured; twice the cyst was punctured per rectum.
† Three doubtful cures.

The general conclusions to be drawn from the statistics of tapping operations, as shown in Table I., are that the death-rate has been about 19 per cent.; that in 46 per cent. it evidently failed to cure the patients; and that, although 54 per cent. were regarded as relieved or cured, still in the majority of them the patients had not been under the observation of the operators for a sufficiently long time after the operation to justify the conclusion that a permanent cure had been effected.

Summary of the Results of Tapping Operations:—

Deaths	18·88	per cent.
Not relieved	0·99	,,
Unsuccessful punctures followed by other operations	26·04	,,
Total failure of punctures	45·91	,,
Relieved	14·51	,,
Reputed cures	39·56	,,
Total successes of punctures	54·07	,,

The results of aspiratory puncture show only about half the ratio of deaths as compared with puncture with an ordinary trochar. The mortality rises with the number of tappings required. The best results are met with in living juvenile echinoccocci of moderate size, the worst in old degenerated or suppurated cysts.

(*b*) The Treatment of Echinococcus Cysts by Means of Medicated Injections.

Injections have been extensively employed as adjuncts to various forms of radical operations, *e.g.*, in the course of treatment by caustics and by canule-à-demeure, &c.; their object being, partly to evacuate the solid contents of the sac, and partly to correct decomposition; however, they have also had a limited use as direct parasiticides, and also, apparently, with a vague idea that they caused adhesive inflammation in the sac, and thus led to the cure of the disease; in this case puncture forms, of necessity, a part of the treatment.

Out of eighteen cases in which injections were employed in this manner, five died and thirteen recovered. Numerous substances have been used as injections, *e.g.*, iodine, alcohol, carbolic acid, ox-bile, extract of male fern, &c.; the latest modification being that suggested by Professor Bacelli, of Rome; he advises that about ten centigrammes of the contents of the parasite should be removed, and replaced by an equal bulk of a two per 1000 solution of mercuric chloride. At present, no satisfactory conclusion can be drawn as to the effect of this treatment, but there seems to be no reason to expect better results from it than from the use of iodine or carbolic acid. (For a fuller discussion of this mode of treatment see the *Australian Medical Journal*, June 1888.)

(*c*) The Treatment of Hydatid Cysts by Electricity.

Electromotive force has been tried in various forms for the purpose of destroying this parasite, as faradism, galvanism, and by way of electrolysis. The last-named is the only form of application of electricity worthy of serious consideration. It has been tried principally in cases of liver echinococci. Out of twelve cases, collected from various sources, one died; in one case it distinctly failed to cure, but in the remaining ten cases it was claimed that cure resulted.

In one case of Splenic hydatid recorded by Magdelaine (Paris Thesis, 1868), electro-puncture was tried for one minute, but indications of peritonitis followed in a few days, and the patient was then successfully treated by Recamier's method. For the present it seems to me that the successes claimed for electrolysis in the treatment of this disease are probably referable simply to the puncture which is its necessary accompaniment. (For a further discussion of this subject, see the *Australian Medical Journal*, June 1888.)

Radical Operations.

We now arrive at the consideration of "Radical Operations." These include—(*a*) Caustic treatment; (*b*) Canule-à-demeure operations; and (*c*) Various modifications of incision procedures.

(*a*) Caustics. Recamier's Method.

The uncertainty of cure after tapping with a fine trochar, and the danger occasioned by the escape of the cyst contents into the peritoneal cavity when a large instrument is used, led to attempts being made to procure adhesions between the sac and the parietes by various methods. One of the earliest and most important of these, was the use of caustics, applied repeatedly at short intervals of time, until the surface of the sac was reached, or even until an opening in the sac itself was procured; the contents were then removed, and the effects of their decomposition were, as far as possible, corrected by the use of antiseptic injections. The principal chemical agents employed for this purpose were caustic potash and zinc chloride.

As the process of opening the cyst by caustics was a very tedious one, many operators hastened it by making incisions to a certain depth, and then applying caustic to the floor of the wound, and in the majority of cases the sac itself was opened either by an incision or by puncture with a large trochar. The general results of the caustic method appear in Table II.

Table II.—*Showing the Results of Treatment by Caustics in Ninety-five Cases of Echinococcus Cysts Situated in Various Organs*:—

Organ Affected.	Deaths.	Failures to Cure.	Cures.	Result Unknown.	Total.
Liver	25	2	55	2	84
Kidney	3	—	1	—	4
Spleen	4	—	2	—	6
Abdominal hydatids of uncertain seat ..	—	—	1	—	1
Total	32	2	59	2	95

Summary of Table II.

Deaths	33·68 per cent.
Cures	62·10 ,,
Failures to Cure	2·10 ,,
Result Uncertain	2·10 ,,
	99·98 ,,

It will be seen that about one-third of the cases so treated died.

This method of treatment is to be condemned for the following reasons:—

(1) Its high mortality, nearly thirty-four per cent.

(2) Its extreme painfulness; for in children it has even been found necessary to discontinue the treatment for this cause.

(3) Its prolonged duration; probably three or four months on an average are required for convalescence, which can hardly be said to begin until the mother-cyst has escaped.

(4) Its total inapplicability in some localities, *e.g.*, for lung hydatids, or pelvic cysts.

(5) Even when applicable in a given case, it cannot be depended upon to procure efficient adhesions.

For these reasons, Recamier's treatment should forthwith pass into disuse.

(*b*) Canule-à-demeure.

The aims of this plan of treatment are identical with those of Recamier's method, viz., to establish a free opening into the sac of the parasite, in order to extract its contents, and at the same time to establish adhesions, in order that none of the cyst contents should escape into the peritoneal cavity; there can be no doubt that this method represented a great advance upon the treatment by caustics, as is sufficiently proven by its lower death rate, and also by the fact that it can be adopted when the parasite is situated within the limits of the thoracic parietes. In ninety cases in which this treatment was employed for liver hydatids, there were twenty-four deaths, or at the rate of nearly twenty-seven per cent.; but this is better than the death-rate of the caustic treatment, which amounts to over thirty-three per cent. In three cases of splenic hydatid, however, so treated, all proved fatal. In a large proportion of the fatal cases, death took place from septicæmia, caused principally by imperfect evacuation of the cyst contents, which generally soon become decomposed; two of the deaths from peritonitis appear to have resulted from escape of the cyst contents into the peritoneum, and in one of them the canula had slipped out of the sac.

The objections to the canule-à-demeure treatment are:—

(1) The uncertainty of the course of the canula. In most cases it is not difficult to avoid transfixing the intestine or stomach, but it is common to traverse the omentum; but in the case, for example, of a pelvic hydatid projecting in the hypogastric region, it may easily happen that the urinary bladder may be carried up by the cyst, and that it may be transfixed by the trochar. It is needless to comment upon the probable result.

(2) In the case of a deeply-seated cyst, it is quite common for the canula to slip out of the sac, in consequence of the collapse of the parasite, caused by the evacuation of its fluid contents. I have seen fatal pneumo-thorax caused in this way, by an attempt to treat a pulmonary cyst by canule-à-demeure; even when a long trochar is used this may happen, and on the other hand, if the instrument be too long, it may wound the distal wall of the capsule.

(3) It is practically impossible to prevent the cyst contents from becoming septic; the amount of discharge is so great that the usual

antiseptic precautions fail; indeed it is probable that if perfect asepticism could be maintained, adhesions would not form; this, at any rate, has been the experience of Trendelenburg with regard to Simon's operation of double puncture, in which two canulas are retained in the sac for the sole purpose of causing adhesions.

(4) The process is a slow one, for on an average convalescence occupies from two to four months, and it has been known to extend to ten or twelve months; the reason of this is, that a considerable time is occupied in the process of making an opening into the sac of sufficient size to allow the mother-cyst to be extracted, and usually it comes away in fragments, and until all the solid constituents of the parasite have been removed, the sac rarely closes; moreover, the presence of any shreds of membrane induces suppuration and decomposition in the sac, and thus tends to cause septicæmia, and to delay convalescence.

(c) Various Forms of Incision Operations.

Operations by incisions upon hydatid cysts are influenced in an important manner by the precise locality of the parasite, so that it is necessary to consider separately—(*a*) abdominal, and (*b*) thoracic hydatids.

Some hydatid cysts, which have their origin within the abdomen, necessitate operations which invade the thoracic cavity, *e.g.*, echinococci of the convex surface of the liver, and those connected with the upper part of the spleen.

In consequence of their relative frequency, the most important abdominal hydatids are those of the liver, and consequently they merit our first and most attentive consideration.

The Treatment of Echinococcus Cysts of the Liver by various kinds of Incision Operations.

The recorded cases of liver echinococci, treated by various modes of incision, comprise a motley group. The earlier cases so dealt with were usually operated on under the impression that they were abscesses pointing on the surface; but, in later instances, the incision was made after unsuccessful attempts to cure the disease by other plans of treatment, such as tapping and canule-à-demeure, &c. Very frequently, during the employment of the caustic treatment, the sac was opened by an incision when it was believed that adhesions had been procured; and in other instances, preliminary incisions were made into, but not through, the abdominal walls, caustics being then applied to the bottom of the wound. In a few cases, non-suppurating hydatids were rashly cut into, without any precautions being taken to previously procure adhesions, the result generally being that the patient died quickly of peritonitis from escape of the cyst-contents into the peritoneal cavity. The danger of such a procedure soon forced itself upon the notice of operators, and thenceforth it became a recognised principle, that hydatids of the liver should not be incised, unless adhesions were believed to be present.

To attain this end, caustics were used by many operators, but others regarded them as unsatisfactory, and various means of procuring adhesions were suggested and practised. For example, Trousseau had recourse to multiple acupuncture for this purpose. Begin's method

consisted in reaching the tumour by repeated incisions, the wound being meanwhile plugged with lint ; sometimes the first incision was carried down to the peritoneum, and occasionally even through that structure. A modification of this procedure, resulting from the introduction of the antiseptic method, has been advocated and successfully practised by Volkmann. Another plan, having a similar aim, is Simon's method of double-puncture, followed by incision. Finally, as a result of the recent advances in abdominal surgery, comes the method of treatment generally associated in Germany with the name of Lindemann, of Hanover, by which the sac is immediately incised, its contents evacuated, the lips of the wound in the fibrous capsule being securely attached by sutures to the edges of the parietal incision.

Before entering into a detailed discussion of these various operations, it is necessary to distinguish between those cases in which the parasite is accessible through the abdominal parietes, and those in which it can be reached only by traversing the pleura, as when the cyst occupies the convexity of the liver; for it is obvious that the invasion of the pleura introduces a new element of difficulty and danger into the treatment.

In order to arrive at trustworthy conclusions, it is necessary also to separate those cases in which no precautions against escape of the cyst-contents into the peritoneal and pleural cavities have been taken, from those where such precautions have been taken. Also, it is needful to consider the influence of antiseptic treatment ; of complete evacuation of the solid and fluid contents of the sac ; of effective drainage, &c.

It follows that a just criticism of the results of the various incision operations is not by any means a simple matter. Operations by incision will be considered under two principal groups, viz., (*a*) abdominal incisions, (*b*) thoracic incisions.

1.—*Simple Abdominal Incisions, without precautions.*

In this class will come simple abdominal incisions in which no special precautions were taken to prevent the escape of the cyst contents into the peritoneal cavity. Many of these were operated upon under the mistaken idea that they were cases of abscess.

General Results.

	No. of Cases.	Per Cent.
Deaths	23 ..	38·5
Cures	34 ..	56·5
Recoveries	3 ..	5·0
	60	100·0

It will be seen by the above table that simple incision, without precautions, is a very mortal operation.

Causes of Death.

	Cas
Peritonitis certainly in	7
Peritonitis probably in	4
Septicæmia ,, ...	7
Exhaustion ,, ...	1
Pleurisy ,, ...	1
Uncertain ,, ...	3
	23

Peritonitis seems to have been the cause of death in about half the fatal cases, and to have been itself occasioned by the escape of the cyst-contents into the abdominal cavity; in one instance, however, the fatal peritonitis was produced by the accidental puncture of the bladder in an attempt to procure drainage. The majority of the remaining deaths were apparently due to imperfect evacuation of the decomposed cyst-contents causing blood-poisoning. Multiple cysts were present in five fatal cases.

Cures.—In 23 of these cases it is clearly set forth that suppuration had taken place in the sac, and consequently, there is little doubt but that adhesions had formed; indeed, in some instances, it is expressly stated that the tumour was regarded as an abscess. It would profit little to devote much space to the discussion of this form of treatment; it suffices, however, by its appalling mortality, to teach the lesson that the cyst-contents should be jealously excluded from the peritoneal cavity. This vitally important object may be attained, before the opening of the sac, as by the methods of Simon and Volkmann, or at the time of incising the sac, as by the method of Lindemann.

Simon's Operation of Double-Puncture followed by Incision.

References.

Simon.—Mittheilungen aus der chirurgischen Station des Krankenhauses zu Rostock.—*Deutsche Klinik*, No. 43, October 27, 1866.

Uterhart.—Ueber die Incision nach Doppelpunktion zur Heilung der Echinococcencysten des Unterleibes, nebst Beschreibung zweier Operations-fælle, welche in der chirurgischen Klinik des Rostocker Krankenhauses vorkamen.—*Berliner Klinische Wochenschrift*, No. 17, April 27, 1868.

Wolff.—Operative Behandlung zweier Unterleibs Echinococcen, nebst einigen Bemerkungen ueber fünf fruher in der hiesigen Klinik operirte Fælle.—*Berliner Klinische Wochenschrift*, No. 5, January 31, 1870.

Trendelenburg, in Madelung. Beitræge Mecklenburgischer Ærzte zur Lehre von der Echinococcen-Krankheit.—Stuttgart 1885, page 155, et seq.

Recognising the dangers of permitting the escape of the cyst-contents into the abdominal cavity, and impressed with the disadvantages of the method of Recamier in the treatment of liver hydatids, Simon devised and practised the method of procedure associated with his name. It must be premised, that both by Simon and by his followers it was considered that suppuration of the cyst-contents formed an essential feature of the intended process of cure; this is clearly set forth in the contributions both of Uterhart and Simon himself (*loco cit.*)

The plan of operation as described by Uterhart is as follows:—At the most prominent part of the tumour, or where fluctuation is most pronounced, a fine exploratory trochar and canula are introduced to a depth of some inches; the trochar is removed, and the character of the fluid that escapes is observed, in order to establish the diagnosis; if this be satisfactorily determined, a second fine or a somewhat larger instrument is inserted at a point two and a half or three centimetres (say an inch) distant. After a part of the contained fluid has been permitted to flow away through the canulæ, the latter are plugged with

carbolised wax, and a protective dressing is applied; for the next few days the patient must remain very quiet in bed. In two or three days' time a portion of the accumulated fluid is again allowed to escape in order to see whether it contains any admixture of pus, and this inspection is repeated at intervals until the opacity of the fluid, and the penetrating odour, render probable the detachment and commencing decomposition of the mother-cyst. Simon generally allowed the canulæ to remain in the sac until the fluid of the cyst began to escape at the sides of the instruments. Then adhesions are likely to have been established between the sac and the parietes, and now incision into the cyst is performed between the two points of puncture. Unless some urgent symptoms, such as high fever with signs of oppression, appear, the operator may delay incision until the fourteenth day, or later. The solid constituents of the parasite should be removed as completely as possible by means of forceps, &c.

Uterhart compares this method with the caustic treatment, and insists upon the following points in its favour:—

1. That the diagnosis is safely established, before the commencement of the operation, by the introduction of the first canula.

2. The great certainty of the production of adhesions between the sac and the parietes. He states that on one occasion, after the double puncture of a case of hydro-nephrosis, in a person who died soon after the operation from double pneumonia, the post-mortem examination showed that very extensive adhesions had formed within 48 hours. It can also be seen that, in two or three days' time after puncture, the tumour no longer slides under the abdominal walls synchronously with the movements of respiration. It can hardly be doubted that, as compared with the caustic treatment for the production of adhesions, Simon's method is preferable.

3. The lesser degree of reaction upon the general health, and the smaller amount of painfulness, as compared with Recamier's plan.

4. The shorter duration of the treatment prior to the opening of the sac—ten to fourteen days after double puncture the sac may be incised, whilst in some cases under caustic many weeks or even months may elapse before a free exit is procured.

A modification of Simon's procedure was practised in one recorded case by Boinet. A large cyst of the liver was treated by canule-à-demeure, the patient soon showing dangerous symptoms of septicæmic poisoning, apparently due to decomposition of the contents of the sac and imperfect drainage. To relieve the patient Boinet removed the canula, and passed along its track a strongly curved trochar, so as to make a counter-opening into the sac; through this canula he transmitted an india-rubber drainage tube, the two projecting ends of which were secured together outside the abdominal wall; in the course of a few days, feeling assured that adhesions had formed, he divided the tissues between the outlets of the drainage tube.

It cannot be denied that Simon's operation represented a decided advance upon Recamier's method, but still it left much to be desired. Simon thought that radical operation was not permissible in recent cases of hydatid disease, and that it should be performed only when the tumour had attained a considerable size, or when suppuration had taken place; he regarded old cysts, with rigid walls, as those particularly

suited for his method of treatment. Uterhart, however, considered that all cases of echinococcus cysts, that could be satisfactorily diagnosed, were fit cases for this operation.

Objections to Simon's Operation.

1. Suppuration of the cyst-contents, with resulting pyrexia, &c., seems to be an invariable accompaniment of Simon's operation; the temperature usually ranges from 100·4° to 102·4°, and continues until the sac is incised; it has been attributed by Wolff (*loco cit.*) partly to the peritonitis excited by the irritation of the canulæ, but as it generally subsides soon after incision of the cyst, it is more probably due to the retention of suppurated cyst-contents. It is acknowledged by most writers who have advocated this method, that suppuration, if not an essential element of it, at least is its constant accompaniment; occasionally attempts have been made to treat the cases by antiseptic precautions, but usually, if not invariably, this has failed, for the sac has generally suppurated, or adhesions have not formed.

As an example of the extreme difficulty met with in the attempt to carry out Simon's method with Listerian precautions, I may cite briefly a case treated in Volkmann's *clinique* at Halle, and recorded by Ranke (*Berl. Klin.*, *Wochensch.*, Nov. 9, 1874, page 565). In this instance, a hydatid cyst of the liver was first punctured by an exploratory trochar under strict antiseptic precautions, and normal clear non-albuminous hydatid fluid escaped; an attack of urticaria followed; five days later two canulæ were introduced, also with antiseptic measures, and after the escape of 1500 grammes of light-yellowish clear fluid containing traces of albumen, the canulæ were plugged with carbolised wax; Lister's dressing was applied and continued for six days; the canulæ were then removed and replaced by a silver sound for three days. During the whole of this time the temperature remained normal; then continuous pyrexia, with increase in size of the tumour, came on. Seventeen days after puncture, incision was performed, and it was found that the omentum, which was adherent to the parietal peritoneum, had to be divided in order to reach the cyst, and yet in this case suppuration took place; and notwithstanding this, when the sac was incised, it was found necessary to stitch it to the abdominal wound. As an indication of the pains taken in the treatment it may be stated than no fewer than four dressings daily were employed for some time; Ranke naturally points out that this would be impracticable in private practice.

2. Trendelenburg (*loco cit.*), who had enjoyed special opportunities of witnessing and practising Simon's method at Rostock, remarks that it was not found to be satisfactory, because it could not be depended upon to procure adhesions, at any rate to a sufficient extent to make the subsequent incision safe eight days after the insertion of the canulæ. Indeed, he attributes Simon's success in obtaining adhesions to his use of non-disinfected canulæ, in consequence of which a rapid decomposition of the cyst-contents took place, and this evoked adhesive inflammation between the sac and the parietes, and Trendelenburg found that by the strictly antiseptic use of this method, the adhesions were so imperfect at the time of incision that it was found necessary to stitch the sac to the parietes.

The Results of Simon's Operation.—I have been able to collect only 24 cases in which this method of treatment was adopted; in 21 of them the parasite was situated in the liver, in 3 in the spleen.

Liver Echinococci Treated by Simon's Method.—Out of the 21 cases, there were—cures 10, deaths 10, result not stated 1 case. As regards the fatal cases, one died, not from the operation or the parasite, but from dysentery which was, at the time, prevalent in the Hospital where the patient was treated. Peritonitis was the immediate cause of death in more than half, *i.e.*, in five instances; in some of them it is expressly stated that when the incision was being performed it was noticed that the adhesions were very imperfect, and it is probable that, in most of the cases in question, the peritonitis was caused by imperfect closure of the peritoneum, and consequent escape of the fœtid contents of the cyst into the abdominal cavity. Septicæmia was the cause of death in two cases; in one it was associated with erysipelas, in the other it was largely due to the slow and imperfect evacuation of the putrid cyst contents. In one case, recorded by Fiedler (*Deutsch. Archiv für Klin. Medic.* 1869), the patient died of collapse immediately after injection of the sac (see *Australian Medical Journal*, March 1889.)

Hydatids of the Spleen Treated by Simon's Method.—In one case, reported by Uterhart, two fine trochars were inserted into the tumour in the usual manner, but when the bridge of tissues between the punctures was incised, it was discovered that some intervening coils of the intestine had been cut, and that the canulæ had penetrated only one centimetre deep into the sac; the cut intestine was sutured, and the patient recovered both from his hydatid and the operation. Perhaps no case could more clearly demonstrate the drawbacks of Simon's method than this one does. A second case by Wilde (*Archiv. für Klin. Medic.*, von Ziemssen, VIII.) recovered, but the fistula did not entirely close for 16 months. A third case, recorded by Wolff (*Berl. Klin. Wochenschr.* 1870, No. 5, page 56), died 25 days after the operation, of pyæmia.

The general results of Simon's treatment, in the published cases that I have met with, are therefore by no means good, as the following summary shows:—deaths, 11; cures 13 cases. One of the deaths was not due to the parasite or the operation.

Incision Operations Performed in Two or More Stages; Methods of Bègin, Volkmann and others.

The attempt to procure adhesions between the parietes and the sac or the liver overlying the hydatid, has been made by carrying an incision cautiously down to the peritoneum, or even through that structure; the resulting wound being then plugged for a few days, until the irritation of the injury and the dressing has caused local peritonitis and adhesions. Begin followed this plan, and plugged the wound with common lint; but after the introduction of the antiseptic method, the dressing consisted of carbolised gauze, &c.—this modification is known in Germany as Volkmann's method. In another modification the surface of the sac is exposed, and is then stitched to the lips of the wound, which is packed with an antiseptic dressing.

I have collected seventeen cases treated by one or other of these procedures, with fourteen recoveries and three deaths.

This operation is decidedly inferior to that of Lindemann, which is next described, and presents no advantages as to safety.

Lindemann's Operation.

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Sænger.—Zur Operativen Behandlung der Abscesse und Hydatiden der Leber.—*Berliner Klin. Wochenschrift*, 1877.

Kirchner.—Ein Beitrag zur Operation der Echinococcen der Organe der Bauchhohle.—*Inaug. Dissert.* Berlin 1879.

Schlegtendal. -Die Lindemannsche Einzeitige Operation der Echinococcen der Bauchorgane.—*Archiv fur Klinische Chirurgie*, 1886.

Landau.—Zur Operativen Behandlung der Echinococcen in der Bauchhohle.—*Berl. Klin. Wochensch.*, 1880.

Lawson Tait. —Four cases of Hepatotomy.—*Birmingham Medical Review*, October 1881.

Schlegtendal (*loco cit.*) has conclusively established the claims of Lindemann to be considered the practical originator of the mode of treatment of hydatid cysts associated with his name in Germany. The first operation of this kind, at any rate of which we have clear details, was performed by Lindemann in 1871 ; but the earliest account of the method was not published until 1879 by Kirchner (*op. cit.*)

The history of Lindemann's first case, as related by Schlegtendal, is interesting. The patient in question had a tumour of the liver, relative to the nature of which a difference of opinion existed between Lindemann and Stromeyer. The tumour was so tense, and the abdominal wall overlying it so thin, that spontaneous rupture was imminent, and an incision was performed. The opening in the sac was attached to the parietal incision by deep stitches, and the patient recovered rapidly. Although this operation was apparently not premeditated in the form in which it was performed, yet the lesson taught by it was not lost, and in future Lindemann incised the parietes, exposed the sac, opened it, and stitched it to the abdominal wound, all under antiseptic precautions; and thus he initiated what is without doubt the most effective and safe form of radical treatment.

Meanwhile, and two years prior to the publication of Kirchner's work, Sænger (*loco cit.*) published a method of operation, which differed but little from Lindemann's plan. The abdominal wall was incised down to the cyst, which was at once secured by stitches to the lips of the external wound, and then was incised. Landau's operation was practically similar. Lawson Tait, in 1881, published an account of four cases, in which virtually the method of Lindemann had been followed. Further allusion to the history of the operation is needless, for any credit of priority must in fairness be conceded to Lindemann, of Hanover.

The Mode of Operation.

The usual procedure of antiseptic laparotomy is employed, with or without the troublesome adjunct of the steam spray. Before the peritoneum is reached all bleeding is arrested, either by forci-pressure, or, if need be, by aseptic ligature (carbolised kangaroo tendon, catgut, or silk) ; the peritoneum is then carefully incised to the same extent as

the rest of the parietal layers, and now usually, if the site of the operation has been well chosen, the surface of the parasite enclosed in its sac appears. Occasionally a piece of omentum, or even a loop of intestine may intervene, and in some cases (especially if the parasite be very old, or suppuration have taken place) the sac may be adherent to the parietes. When this is not the case, a loop of stout aseptic silk is passed through the sac wall on each side, parallel to the lips of the wound. In order to pass these loops through the tough sac, I have found it most convenient to employ a strong well-curved needle, set in a firm handle; the needle may be threaded either before or after having been passed through the sac.

After the passage of the needles and loops, there is usually some escape of the fluid contents of the cyst at the sites of the puncture. This is especially apt to occur in the case of living echinococci in which the fluid is at a high pressure. Great care should be taken to prevent the escape of the fluid—especially if it be purulent or fœtid—into the peritoneal cavity; this can be done by drawing the sac firmly up to the parietal wound by means of the loops, and by the use of a sponge. A part of the fluid contents of the cyst may now be removed by means of a trochar, or the sac may be immediately incised. When most of the fluid has been evacuated, the lips of the cut in the sac must be carefully stitched to the corresponding ones in the parietal wound. For this purpose carbolised kangaroo tendon, or silk, or silver wire may be used; the stitches should be applied at intervals of about a quarter of an inch apart, so as to closely unite the sac to the external wound; some operators include the skin, others, such as Trendelenburg, include only the peritoneum, the muscular layers, and tendinous fasciæ. It is claimed that by excluding the skin, there is less risk of dragging on the lips of the wound during the contraction of the sac that occurs during the process of cure. It is an open question, however, whether the greater security of hold obtained by including the skin does not compensate for the local irritation often produced by the tension upon the skin. I have seen much redness of the skin around the wound, and even the detachment of a piece of the fibrous capsule, result from this cause, but apparently without any untoward influence upon the process of cure; the irritation of the skin soon subsides after the removal of the deep stitches.

When the sac has been safely stitched, the solid and remaining fluid contents of it should be carefully, and if possible completely, removed; for it must be remembered that these are foreign bodies, and until they are completely expelled, the sac cannot close. I place great stress upon this, for the presence in a remote *cul-de-sac* of even a small shred of cyst is a cause of continued discharge. To attain this object, various forms of forceps are useful, but it is desirable that instruments for this purpose should be provided with broad fenestrated jaws, which bite in parallel planes, and so obtain a wide but gentle grasp. Much care is needed to prevent the tearing of the mother-cyst in the process of its removal. In order to remove the daughter-cysts, if any be present, and to get rid of any fragment of the mother-cyst that may remain, it is advisable to wash out the sac with sterilised water, thymol or carbolic lotion, or some other antiseptic fluid; a syringe, provided with a long tube, being inserted to the bottom of the sac.

Finally, a long and wide india-rubber drainage tube, with lateral perforations, is inserted into the wound, and the patient is turned on the side, in order to drain the cavity of the injection still left in it. It is also an excellent plan to withdraw, by means of a syringe, to the nozzle of which a long piece of india-rubber tubing is attached, the last traces of fluid from the bottom of the sac; or the interior of the cavity may be sponged dry.

Antiseptic dressings of some kind should certainly be used. I am in the habit of employing a large pad, the basis of which is a layer of picked oakum about an inch-and-a-half thick, over this is spread a layer of Hartmann's wood-wool to the depth of half an inch or so; the whole is then enclosed in a layer of alembroth or other antiseptic gauze. The pad is so placed as to provide for the natural gravitation flow of the discharge.

If the sac be thoroughly cleared out at the time of the operation, the amount of the discharge is usually small, but a daily dressing is commonly needed for the first few days. If the case proceed satisfactorily, there is no suppuration from the sac, but there is usually a little pus discharged from the lips of the wound. The stitches may be removed in five or six days.

By Lindemann's operation, unlike Simon's, suppuration of the sac is not a necessary element, but, on the contrary, an accidental and undesirable one. The normal process of cure was well seen in the case of a child, aged 8, treated in 1886 by my colleague, Dr. Verco. Lindemann's operation was performed, and for four days the progress of the case was satisfactory; on the fifth day, however, convulsions came on, with increased rapidity of pulse and respiration, and deepening loss of consciousness, and the patient died, from no evident cause discoverable during life or after death. The condition of the sac was as follows:—"The walls of the cavity had folded together over a considerable area, especially at the outer and back part, so that the opposed surfaces had come together, and here lymph had been poured out, which had united the surfaces by plastic adhesion, and had to this extent obliterated the sac."

Early union of this kind can only take place when the fibrous capsule is not rigid from degeneration; but when the opposite condition exists, the process of cure must, of necessity, be less prompt, for the walls of the cavity do not readily fall together.

When the walls of the cavity collapse, after the removal of the mother-cyst, &c., it is, in my opinion, better not to use injections during the after treatment, but when drainage by collapse of the sac and gravitation is inadequate, and pus accumulates, as when the parasite invades or starts in the pelvis, injections may be necessary. I have seen pyrexia result in such a case from no discoverable cause, except that, in spite of the use of large drainage tubes, &c., the secretions of the cavity could not freely escape.

In cases where there is a tendency to the accumulation of the secretions of the capsule in the pelvis, probably the employment of aseptic capillary drains, enclosed in india-rubber drainage tubes, would be preferable to injections. I have not yet had the opportunity of trying this mode of drainage in hydatid cysts.

The Results of Abdominal Sections performed on Hydatid Cysts of the Liver, according to Lindemann's Method.

I have collected 68 cases of Liver Hydatids, treated by abdominal section, immediate removal of the mother-cyst, and stitching of the sac to the parietal wound.

GENERAL RESULTS.

Deaths	..	**7 or 10·29 per cent.**
Recoveries	..	61 or 89·70 per cent.

Deaths.—In one case the patient died during the operation from the sudden arrest of the circulation through the heart, by a hydatid cyst in it. In two cases there were multiple hydatids in the body.

Cures.—These amounted to the extraordinarily high proportion of nearly 90 per cent., and this fact alone establishes the claim of this operation to be regarded as by far the best method of treatment of liver hydatids now practised, at any rate when the cyst is accessible by an abdominal incision.

Not only are the final results good, but the duration of convalescence is brief, for in 19 cases in which this point is alluded to, the period of convalescence was as follows:—

In 3 weeks	1 case.
In 4 weeks	2 cases.
In 5 weeks	2 cases.
In 6 weeks	1 case.
In 2 months	6 cases.
In $2\frac{1}{2}$ months	4 cases.
In $3\frac{1}{2}$ months	3 cases.
	19

THORACIC INCISIONS.

Cases of Hydatid Disease treated by Incisions through the Chest Walls, with or without excision of a portion of one or more ribs, belong to five distinct groups, viz:—

1. Unruptured Hydatids situated on or near the convex surface of the Liver, and therefore not accessible by abdominal incision.
2. Hydatid Cysts, usually of the right lobe of the Liver, which have ruptured into the Pleura, treated by incision and drainage of the pleural cavity.
3. Pulmonary Hydatid Cysts which may or may not have ruptured into the bronchial tract.
4. Pulmonary Hydatids which have ruptured into the Pleura.
5. Hydatids of the Pleura operated on by Incision. These are but few in number, and will not be described in this communication.

1.—*Unruptured Hydatids situated at or near the Convex Surface of the Liver.*

Echinococcus cysts which have originated near the upper surface of the liver, but still within that organ, usually grow in the direction of least resistance, which then happens to be upwards. They consequently invade the right chest, and often are with difficulty to be distinguished from hydatids of the base of the right lung. Cases have been recorded in which the parasite appeared to have originated between the diaphragm and the upper surface of the liver; and what is perhaps even more

curious, hydatid cysts have been met with in the substance of the diaphragm itself. For example, Vital* mentions the case of an Algerian native, aged 35, who died of chronic dysentery, at whose post-mortem examination numerous hydatids were found, including one of the size of a child's head, which had developed in the substance of the diaphragm, and was covered in part by the peritoneum, and in part by the pleura.

In the Pathological Museum of the University of Oxford, there is also a specimen of this kind.

Until quite recently, hydatid cysts in this locality have always been treated by puncture with a fine trochar or aspirator needle; a few, however, have been dealt with by the canule-à-demeure method.

The results of the treatment of liver cysts by canule-à-demeure traversing the thorax, have not been very satisfactory, for in five such cases collected by me, there were three deaths and two recoveries.

The main difficulties in this mode of treatment, as applied to cysts in this locality, have been to prevent the canula from slipping out of the collapsed cyst, and to ensure complete evacuation of the cyst contents.

1.—*Echinococcus Cysts of the Upper Surface of the Liver, operated on through the Chest Walls.*

The treatment by direct incision through the thoracic walls, of cysts on the convex surface of the liver, is certainly one of the boldest innovations of modern surgery. As far as I have been able to discover, the first deliberate operation of this kind was performed by Israel.. It was briefly alluded to in Virchow and Hirsch's Jahresbericht for 1879, Vol. II., page 412.

In this case, an incision was made in the axillary line, an inch of the sixth rib being removed, and the pleura was opened to a corresponding extent; the wound was then plugged with antiseptic gauze. Seven days later the diaphragm was incised, and the wound was again plugged with gauze. Finally, nine days afterwards, the sac itself was freely incised, evacuated, and drained.

An undoubted improvement upon this method is to cut immediately down to the sac, to pass a couple of loops of stout carbolised silk through it, in order that when the sac collapses by the evacuation of its fluid contents, it may not retract beyond reach. The sac being securely held by the loops, a trochar is passed into it midway between the loops, and a part of the fluid is permitted to escape in order to reduce the pressure in the sac, and so prevent any escape into the peritoneum; the sac is then freely incised, and the mother-cyst, &c., completely removed. If it is found that the opening made into the sac is not likely to freely drain the cavity, a counter-opening should be made at the time of the operation.

The entire treatment should be carried out under strict antiseptic precautions, and here, if anywhere, the steam spray is useful, for unless adhesions happen to exist, pneumo-thorax is inevitable; however, with careful antiseptic treatment and drainage of the pleura, the results are likely to be satisfactory.

* Cited by Lenoel. Kystes Hydatiques de la Rate, Paris Thesis, 1879. Obs. XXIX., page 68.

I have collected seventeen cases in which hydatid cysts of the convexity of the liver have been treated by thoracic incision (*Australian Medical Journal*, August and September 1889) with various precautions against the infection of the pleura; there were 12 recoveries and 5 deaths. In one of the fatal cases, death was not due to operation or to the primary disease, but to hæmorrhage from an ulcer of the stomach. In a second one, the patient was apparently moribund from pneumonia at the time of operation. In another, the cause of death was obscure, the patient was apparently progressing satisfactorily until the fifth day, when she was seized with abdominal pain, supposed to be due to intestinal colic, and died in about twelve hours. At the post-mortem examination, nothing wrong as far as the operation was concerned could be discovered; there was, however, a patch of recent peritonitis on the left lobe of the liver, and old ribbon-like bands of adhesion connected the cyst with the pelvis. It was thought that the stretching of these bands had possibly compressed the intestine, and had thus caused the colic and the fatal result.

2.—*Liver Hydatids which had previously Ruptured into the Pleura, operated on by Thoracentesis.*

This class of cases presents many points of resemblance with lung hydatids which have ruptured into the pleura. In both cases the effects will depend upon various conditions, the principal of which are:—

1. The characters and quantity of the hydatid fluid entering the pleura.

2. Whether the mother-cyst or any daughter-cysts pass into the pleura.

3. Whether, in the case of a liver cyst, bile reaches the pleural cavity, or in the case of a ruptured pulmonary hydatid, air passes in, and if so, whether bacteria are also introduced by the air directly or by putrescent fluid from the pulmonary cavity.

If only a small quantity of clear normal hydatid fluid enter the pleura, there is reason to think that temporary pyrexia and an eruption of urticaria may be the only ill effects, and that the fluid will be rapidly absorbed. If the quantity be large, absorption will not take place, but the mixture of hydatid fluid and resulting pleuritic effusion may remain serous for a considerable time. If the fluid of the parasite be thick and opaque in consequence of degeneration, or still more so, if it be purulent or fœtid, it is nearly certain that a severe form of pyothorax will be induced, which, unless promptly treated, will rapidly destroy the patient.

When pulmonary hydatids rupture into the pleura, the probability of pneumo-thorax is very great, but this is not likely to occur from the bursting of an hydatid of the liver. A case, however, has been recorded by Bristowe (Path. Soc. Trans. 1851–52), in which it was believed that offensive gas had been generated in the pleural cavity by a liver cyst which had burst into it. It is worthy of remark, however, that in this case it is stated that there was a very free communication of the dilated right hepatic duct with the cavity of the ruptured hydatid, and so it is possible that the septic condition arose by way of the duodenum and dilated duct, and did not originate *de novo* in the pleural cavity.

The rupture of an echinococcus cyst of the liver into the pleura is an accident of very great gravity to the patient, and even when operative measures are taken, the risk of death is very great, for among eight cases treated by thoracentesis, no fewer than six ended fatally; it is probable, however, that an operation performed earlier might have been successful in some of the fatal cases.

4.—*Pulmonary Echinococcus Cysts treated by the Establishment of a Free Opening into the Sac, obtained by Incisions or otherwise.*

Hydatid disease of the lungs is without doubt a very grave malady, especially when no surgical treatment is attempted for its relief.

Up to the year 1884, I had collected from various sources 208 cases which had not been operated on, or if operated on, no statement to that effect is made in the reports of the cases. The results were as follows:—

Died	113 cases.
Cured or relieved ..	71 ,,
Result uncertain	24 ,,

If we omit the 24 cases in which the final result was not definitely ascertained, the result stands thus:—

Deaths	61·4 per cent.
Recoveries	38·6 ,,

It is evident, therefore, that the disease is a formidable one, and even if we exclude all the deaths which cannot fairly be attributed to the direct influence of the parasite in the lungs, there yet is sound reason for believing that more than half the cases of pulmonary hydatid, which are not surgically treated, die.*

The most favourable accident of the disease is rupture into the bronchial tract, for about three-fourths of these cases appear to recover; at any rate, the following were the results in 133 such cases:—

Results of Spontaneous Rupture of Pulmonary Hydatids into the Bronchial Tract.

Deaths	31 cases.
Reputed recoveries ..	80 ,,
Result unknown	22 ,,
	133

I have already alluded to the results of puncture in hydatid cysts of the lungs, but it would lead to a digression of undue length to discuss the question fully on this occasion. I shall therefore content myself with the following statements:—

1. That the puncture, especially of large lung cysts, is by no means devoid of immediate danger.

2. That puncture often fails to cure the disease, and that in many cases in which it seems to do so, cure is really effected by the expectoration of the mother-cyst, a process often accompanied by much danger to the patient from suffocation, hæmoptysis, and hectic.

3. That even when the sac has been completely evacuated by the parasite, the vessels on its walls have become so degenerated from the long continued suppuration as to readily rupture and cause hæmorrhage.

* For a fuller discussion on this point, see "Hydatid Disease of the Lungs." Adelaide, 1884, page 45.

This has proved fatal, as in cases recorded by Habershon (Guy's Hospital Reports for 1872-3), and Kidd (Path. Soc. Trans. Vol. 36). It is evident therefore, that it is desirable to reduce to its minimum the period of suppuration.

Less frequently than into the bronchial tracts, pulmonary hydatids rupture into the pleural cavity; generally speaking, such cases prove fatal unless promptly operated on.

In very rare cases rupture has been known to take place externally, or into the pericardium.

Occasionally the cyst continues to enlarge, until the long-continued impediment to respiration and the pressure effects of the parasite destroy the patient.

The probability that any case of hydatid disease, the presence of which has been ascertained during life, will undergo spontaneous cure by degeneration is virtually *nil*.

Upon the whole, I am convinced that patients suffering from moderate-sized or large pulmonary hydatids are most safely treated by free openings into the sac, and immediate removal of the parasite.

I have collected 38 cases in which this method was adopted; of these, 6 died and 32 recovered.

One of these was operated on as far back as 1812, but this and all the earlier cases were treated in this manner, in consequence of an error of diagnosis; they were generally regarded as cases of empyema, pointing on the surface.

There can be no doubt, that to Dr. Bird of Melbourne, Australian physicians are largely indebted for the conviction, that an abscess or suppurating hydatid in the lung should no more be sacred from the knife of the surgeon, than an abscess in the breast.

I am disposed to go a step further in this direction, and to operate upon any case of pulmonary hydatid in which there is proof positive of the nature of the disease and its precise locality, with one proviso, viz., that there shall be a distinct, even though limited area of dulness on some part of the chest-wall; when, on the other hand, the alteration of the percussion note is to the production of a tympanitic note, which seems to me to indicate compression of lung which still contains air, I should feel disposed to puncture with the aspiratory needle.

In the earlier deliberate radical operations upon pulmonary hydatids, the mother-cyst had ruptured, and the operations really were upon abscesses of the lung containing more or less disintegrated hydatid membrane; in such cases, adhesions generally existed between the surface of the lung over the cyst and the costal pleura; consequently, no precautions were thought necessary in order to prevent the escape of the cyst-contents into the pleural cavity. However, it was always uncertain whether adhesions were present or not, until the sac was actually opened, when if there were no adhesions, the mischief was done.

I therefore think that in all cases of this operation, the following procedure should be adopted: An incision about three inches long should be made over the central portion of the cyst; when all the superficial tissues have been divided, and the ribs are exposed, about an inch and a half or two inches of one rib, or if required of two ribs, are excised, the periosteum being previously stripped off by means of a

suitable elevator. The pleura should not be torn, if possible, until the piece of rib has been removed, and until all bleeding has been arrested by the usual measures (it is rarely necessary to use a ligature). A small trochar should now be passed into the cyst through the pleura, and the depth at which fluid is first met with be noticed, and if at this stage the cyst cannot be found, the wound may be closed without serious injury to the patient; this, of course, should rarely occur. The exploration being satisfactory, a strong well-curved needle, set in a strong handle, is passed through the pleura and sac-wall into the interior of the parasite, its point is then brought out so as to include a couple of inches of the wall of the sac, and unless this has previously been done, the needle is now threaded with a loop of stout aseptic silk, which is drawn through by the withdrawal of the needle; a second similar loop is passed through the sac, parallel to the first one; in this way the fibrous capsule is securely held during the next stages of the operation. It is well now to introduce a small trochar midway between the loops, in order to remove a part of the fluid contents of the sac; this lessens the risk of escape of any of the fluid into the pleural cavity, in case adhesions are absent. The sac is now to be freely incised, to at least a sufficient extent to permit two fingers of the operator to pass. The remaining fluid and solid contents of the sac are then removed as completely as possible, by the use of fingers and suitable forceps. Finally, the interior of the empty cavity should be thoroughly sponged out. The wound in the sac is stitched securely to the lips of the external wound; the sutures should be of aseptic material, and stout enough not to easily cut through; for this purpose, carbolised silk, kangaroo tendon, and silver wire, are equally well adapted; a large drainage tube is inserted, and the usual antiseptic dressings are applied. As the contents of the previously ruptured lung hydatids are often already fœtid, strict Listerism is neither necessary nor practicable. The employment of injections in the treatment of these cases is undesirable, in consequence of the severe cough caused by the passage of the fluid into the bronchial tubes. The results are usually excellent and immediate, for cough and expectoration cease, pyrexia disappears, and the patient rapidly gains flesh and strength.

Among the 38 cases collected, there were 32 recoveries and 6 deaths; and of 8 cases operated on by me, 7 recovered completely. In one fatal instance, the right lung was so extensively destroyed by the parasite, that recovery was hardly to be expected. It was estimated that in this case the bladder-worm had a superficies of 256 square inches, and the mother-cyst (drained as completely as possible of fluid) weighed ten ounces avoirdupois.

In two cases, the operation seems to have failed, principally because the sac was not completely emptied of membranes, and because the drainage was inadequate.

4.—*Pulmonary Hydatids which had previously ruptured into the Pleural Cavity, treated by Thoracentesis.*

The rupture of a pulmonary hydatid into the pleura is a source of very grave peril to the patient; but the gravity varies according to circumstances, especially according to the condition of the contents of the sac at

the moment of rupture. If clear normal hydatid fluid is effused in moderate amount, the resulting symptoms are far less alarming than when the fluid has undergone decomposition. It is probably also of great importance whether or not the mother-cyst or any daughter-cysts present have passed into the pleura. The size of the orifice of rupture also must not only affect the extent to which the cyst contents escape into the pleura, but also must influence largely the risk of free passage of air into the pleural cavity by way of the bronchial tubes which open into the sac. It is obvious, that a large opening renders more probable the entry of bacteria into the pleura through the sac, and thus septic changes in the former are more readily induced.

It would appear, that rupture may occur first into the pleura and then into a bronchial tube, or *vice versâ*, or that both events may take place simultaneously. Usually, these accidents appear to occur spontaneously, but now and then, the excitement of a fit of anger, as in a case recorded by Fouquier;* or an injury to the chest from a blow with the fist, as in a case under my care; or a fall from a cab;† or the impact of the chest against the water in diving from a height, as in a case recorded by Wischer,‡ may cause the rupture.

In nearly all the recorded cases, death has resulted from rupture into the pleura, unless surgical measures have been taken to drain that cavity, and permit the remains of the parasite to escape.

I have recorded three cases (*Australian Medical Journal*, September 1889), in which cure followed free incision into the pleura for the relief of this condition. In two of the cases there was fœtid pyo-pneumothorax, in the third the gaseous contents of the pleural cavity were aseptic at the time of the operation.

Operations upon Abdominal Echinococci in which, besides the Parasite, the Fibrous Sac was removed more or less completely.

In a few recorded cases, the fibrous capsule of the parasite has been removed. Sometimes this kind of operation has been adopted in consequence of an error of diagnosis, in others the procedure has been forced upon the operators by the exigences of the case.

In one case, operated on by Spiegelberg (*Archiv. fur Gynækologie*, 1870), a woman, aged 42, had a retro-peritoneal echinococcus cyst connected with the omentum, the large and small intestine, and the right kidney, which was mistaken for an ovarian cyst; the fibrous capsule and a portion of the right kidney were removed. The patient died of collapse twenty-six hours after the operation.

In a second case, operated on by the same surgeon (Spiegelberg, *Archiv. fur Gynæk.*, 1872), a woman, aged 30, had a large abdominal hydatid of retro-peritoneal origin. This was treated by abdominal section, partial removal of the fibrous sac, and suture of the remnant of that structure to the lips of the parietal wound. After prolonged suppuration of the remains of the sac, the patient recovered.

* Cited by Hearn. *Kystes Hydatiques du Poumon et de la Plevre.* Paris Thesis, 1875, page 131.

† St. George's Hospital Reports. Vol. IV., pages 272 and 305.

‡ Cited in Madelung. *Beitrage Mecklenburgischer Aerzte zur Lehre von der Echinococcen-Krankheit.* Stuttgart, 1885. No. 18, page 85.

In 1878, Knowsley Thornton (*Medical Times and Gazette*, Nov. 16, 1878, page 565), operated on a pregnant woman, aged 32, for the removal of supposed ovarian tumours, which proved to be hydatids of the omentum and pelvis. Two bunches of cysts were removed, but some were left untouched. The patient recovered.

FitzGerald (*Australian Medical Journal*, May 15, 1880, page 206), of Melbourne, in 1880, removed the fibrous capsule, together with the bladder-worm, in the case of a large abdominal hydatid connected with the omentum and liver. The tumour was regarded as an ovarian cyst. The patient recovered.

Whitcombe (*Australian Medical Journal*, October 15, 1885), performed a somewhat similar operation upon a large abdominal hydatid of retro-peritoneal origin. The patient died nine hours after the operation.

Another large abdominal hydatid, connected with the left kidney, was extirpated by Hinckeldeyn, in 1880.* The patient, a female, aged 42, died of hæmorrhage, caused by the rupture of the left renal artery in the removal of the fibrous sac.

I have assisted Dr. Way, of Adelaide, at an operation in which several hydatids, connected with the peritoneum and omentum, were successfully removed. One large growth closely simulated an ovarian cyst.

In one case, Spiegelberg † operated upon a hydatid cyst of the spleen by "extirpation." The patient died seventeen hours later.

General Summary.

It is almost impossible, at present, to accurately estimate the real value of those operations for the cure of hydatid disease, in which the mother-cyst is not removed, viz., tapping operations, the use of parasiticide injections and electrolysis, inasmuch as the apparent cure, which often follows, is frequently found to be illusory after the lapse of a short time.

As regards tapping operations, there is reason to believe that they fail to cure the patient in fully 40 per cent. of the cases in which they have been tried; indeed, it is probable that the actual proportion of failures is much greater than is represented by that number.

Taking aspiratory punctures and ordinary tapping operations together, the deaths amounted to nearly 18 per cent., but the mortality following aspiratory puncture, whether single or multiple, was only about half that of punctures with an ordinary fine trochar.

Speaking generally, the greater the number of punctures required in a given case, the smaller is the probability of the cure of the patient by tapping alone.

Simple puncture, although generally devoid of risk, has been known to cause sudden death, sometimes apparently from shock, sometimes, however, in the case of pulmonary hydatids, from suffocation by the fluid contents of the bladder-worm. The objection to puncture as the mode of treatment for internal hydatids, however, lies less in the occasional perils of the operation than in its frequent inefficacy.

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* Cited in Madelung. *Beitrage Mecklenburgischer Aerzte zur Lehre von der Echinococcen-Krankheit.* Stuttgart, 1885, page 135.

† Cited by Mosler. *Ueber Milz-Echinococcus und seine Behandlung.* Wiesbaden, 1884, page 24.

Of the use of parasiticide injections into the sac, and the employment of electrolysis, it may be asserted that there is at present no evidence in favour of these methods of treatment that does not apply equally forcibly to simple puncture, and, moreover, each possesses drawbacks of its own.

The question of choice between the various forms of radical operation is, at any rate for abdominal hydatids, simple, for their mortality is widely different, as a reference to the following table will show :—

Mortality of various Radical Operations.

Caustics	33·68	per cent.
Canule-à-demeure	26·66	,,
Simon's method	48·00	,,
Volkmann's method	19·05	,,
Lindemann's method (abdominal sections)	10·29	,,
Do. (thoracic incisions)	29·41	,,

With regard to hydatids of the liver or of the lung, which have ruptured into the pleura, thoracentesis is the only resource which offers itself.

Unruptured echinococcus cysts of the convexity of the liver present great difficulties in their successful treatment, for thoracic incisions show a high rate of mortality.

Pulmonary Hydatids.

The risks and disadvantages of punctures in these cases have been already discussed, and the results of radical operations are so favourable, that but little difficulty can occur in the choice of treatment in ordinary cases.

HYDATID OF THE BRAIN—REMOVAL BY OPERATION —DEATH AFTER FOUR DAYS.

By J. C. Verco, M. D. Lond., F. R. C. S. Eng.

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P. B., æt. 10 years 11 months, male, was first seen by me on Nov. 17, 1888, when the following history was elicited :—From infancy he has had an unusually large head ; he began to walk when from twelve to eighteen months of age, quite as early as his brothers and sisters; he was cleanly in his habits as a little child ; he had no trouble during dentition ; he attended school like the rest of the family, and was rather brighter and quicker at his lessons than the others ; he was very liable to attacks of croup until seven years of age, but other than that, had no illness. About five months ago, he began to complain of pains in his head. His mother fancies this might be caused by an injury to his head, received in a fall from a tree eight months ago, but he made no complaint at the time. The headache has increased gradually, and for about three

months he has had screaming at night, due to the pain. Till a month ago, his screams were dreadful; but during the last month the headache has not seemed so severe. It has not been very definite in its seat, but has seemed to be worse on the right side. For about five months he has complained of feeling tired, and has been sighing all day long; and though getting up during the day, he has walked about with his head somewhat on one side (his mother thinks leaning over to the right shoulder), and has had to lie down again. Daily he has seemed less capable, and during the last two or three weeks has not risen from his bed. Three weeks ago, he had three fits. All the mother knows of the first one is, that she left him on the couch, and when she returned, after a few minutes, she found him fallen on the floor, while he was quite ignorant as to how he came there. In the second one, he lay unconscious for a few minutes only on the couch, with working of his face, not of his limbs. The third was similar, and occurred after the interval of a few days. One day he seemed to have some difficulty in speech; he wanted his breakfast, but was unable to find words to ask for it properly. Vomiting has not been frequent; it was first noticed about four months ago, only once or twice a week for about a month; he has had no emesis for three months, but sometimes feels sick. His appetite has been remarkably good throughout, often he is quite ravenous, and calls out at night for food. Grinding of his teeth has been noticed, but it has not been very marked. His bowels have been confined; during the past week he has had no control over them. For the same period, too, he has had incontinence of urine; it does not dribble away from him; sometimes he knows when he wants to pass it, but his mother has to be very quick, or it is passed into the bed. At other times he tells her he wants to micturate, but though she waits upon him, he is unable to void his urine.

Present Condition.—He is a very well nourished boy, and large for his age, with thick black hair, dark brown eyes, and a rosy colour in his face. He lies on his left side. This is the side he prefers, as is evident from the excoriation, ulceration, and bleeding of his left ear from pressure. The forehead is prominent, and the head very large—measuring twenty-four inches in circumference. When it is moved, he screams with pain, apparently in the neck. The head is very tender, especially towards the back, but even moving the fingers amongst the hair appears to cause pain. There is enlargement of the veins in the temporal regions. As he lies—drowsy, but not really asleep—the right palpebral fissure is slightly larger than the left. On laughing, or crying, the right side of the mouth is drawn back slightly but distinctly more than the left; and on lifting the upper eyelids, there is a noticeably greater resistance on the right side than on the left. His eyesight is very dim; this has been only coming on during the last few days. He could see a pencil in my hand at about ten inches distance. The pupils are moderately dilated, and do not react well to light. There is no deviation of the optic axis. There is double optic neuritis, the margins of the discs being blurred, and the discs radiately marked and abnormally white. When he sleeps, his pupils are equal and contracted. He can hear a watch on both sides at about six inches distance. His headache to-day is chiefly frontal, nearly constant. He is said not to have been free from it for a whole day since he took ill. Only rarely has

he had it at the back. When very severe he would lie on the couch on his face, as this position appeared to give him ease. There is hyperæsthesia to touch and pressure over the upper part of the right front chest. Two or three weeks ago he began to complain of pains across the front of the chest, increased by speaking or breathing, but without cough. These have been absent now for two days. There is no appreciable loss or diminution of sensation on either side of the body from head to foot. He calls his left hand his weak one, and does everything with his right; but if his right is held, and he is told to use his left, he can. He is unable with either hand to move the index of the dynamometer. He can move both his legs and feet and thighs in bed. Temperature 101°; pulse 120, regular; respirations 24, irregular and sighing.

Nov. 19.—To-day he is quite blind, cannot tell light from darkness; temperature 101.

Nov. 20.—Pulse 120, regular; temperature 100°; much grinding of teeth.

Nov. 21.—Pulse 104, regular, soft, full; respirations 24, regular; is sleeping; temperature 99·8. Bowels not moved since 17th. Slept fairly well last night, did not scream once. To-day, complains of pain in the right side of the head, about an inch and a half to the right of the middle line, and a little in front of the coronal suture.

Nov. 23.—Pulse 124, regular; respirations 24; temperature 102·4°. Yesterday was much more drowsy, and twice his mother thought he was about to die—his eyes fixed, and his left forefinger was stiff and pointing. To-day she says he is more sensible. Now he lies seemingly fast asleep, but yet brushes away the flies away from his face with his right hand. Bowels opened after purge.

Nov. 24, 5 p.m.—Pulse 112, regular; respirations 28; temperature 101°. Tongue white, moist, fur. It is questionable whether he can taste. To-day, for the first time, I have been able to get his hair all off, because the pain he suffered when she attempted to remove it, caused his mother to desist. Now, on looking at the head from the front, there is seen a slight bulging in the right temporal region and anterior parietal; and looking at it from the vertex, where also it is detectable, it is seen to begin a little to the right of the middle line, about the coronal suture, to involve the back part of the right frontal, on the top of the head, the temporal part of the frontal, and the front part of the parietal, the centre of the bulging being along a line running obliquely backwards and outwards, and just about midway between the external auditory meatus, and sagittal suture. The vertex of the head was flat, the occipital regions voluminous. None of the sutures or fontanelles were opened or soft to the touch.

Nov. 27.—Pulse 128, respirations 30, temperature 101·6°, perspiring. Blister came yesterday on the left external malleolus, from pressure—large one to-day on right heel. On right buttock a large one has broken, and left a bleeding surface. During the last two days, I have been persuading the mother to allow an operation for opening the head.

Nov. 28.—Pulse 128, respirations 30, temperature 101°. He heard what was said yesterday, though seemingly asleep, and during the night was discussing with her the meaning and result of operation. Yesterday, he thought raspberry roll was raw meat; to-day he could recognise it,

and could taste salt. Dr. Thomas saw him with me in consultation, and agreed as to the justifiability and desirability of operation; so the patient was removed to the Adelaide Children's Hospital, North Adelaide, on the 29th. His head was shaved, and wrapped in lint soaked in carbolic acid, and the bed-sores on both ears and feet and buttock properly dressed.

Nov. 30.—Mr. Cookson anæsthetised the patient with ether, and with the assistance of my colleagues, Mr. Hayward and Dr. Lendon, I turned forward a semicircular flap of the scalp, so as to expose the centre of the bulging part of the cranium. Here I removed a button of bone with an inch trephine. The skull was very thin. On exposing the dura mater, it bulged, and was very tense and elastic; and when it was divided by a crucial cut, the brain substance pressed out. An aspirator needle thrust in entered a cavity, and a slightly turbid liquid flowed out. This was caught and examined at once, giving a dense white precipitate with a solution of nitrate of silver; but a precipitate also with nitric acid. The presence of albumen, indicated by the latter test, discounted the evidence of sodic chloride, obtained from the former, and made it uncertain whether the fluid was hydatid. But a sudden stoppage in the flow, and a peculiar tap given to the canula, such as is perceived when a piece of membrane flaps against its end in the aspiration of a hydatid, increased the probability of the presence of a parasite. A pair of dressing forceps was therefore pushed along the track of the canula, and the thin layer of brain tissue torn through by opening it. The finger could then be introduced into an enormous cavity, within which could be detected unruptured cysts. The fluid was allowed to run out by turning the head on its side, and the daughter-cysts washed out by a stream of solution of boracic acid, pumped in through a flexible catheter. Finally the mother-cyst presented at the orifice, and was withdrawn, partly by the traction of forceps, and partly by the lotion introduced behind it. After the emptying of the cavity, it was filled with lotion again, and this, when collected, measured sixteen ounces. The deeper boundaries of the cavity could not be reached by the finger. It extended forward and inward from the trephine hole towards the base. The thin layer of brain tissue around the opening did not collapse, indicating probable slight adhesions between the membranes here; hence the free way into the cavity was not lost on removal of the cyst. There seemed to be a thin bounding membrane between the cyst and the brain. A large drainage tube of red rubber was introduced, and the flap, divided in the middle for its passage, was stitched all round with catgut sutures, and the wound dressed with iodoform powder and a layer of salicylic wool. The air of the room was disinfected by the carbolic acid steam spray during the operation. Was somewhat collapsed after the operation. Slept heavily.

At 2 p.m., temperature 104·2°; sponged with cold water. 4 p.m.—Temperature 104·2°; antifebrin gr. ij given. Left arm rigidly flexed at elbow, bringing the hand to the shoulder; right eyelid closed, left partly open. Some conjugate deviation of eyes to left, but with clonic nystagmus movements to the middle line, and slightly to the right of it; right pupil larger than the left. 7 p.m.—In breathing, right nostril dilates more than the left; eyes quiet. Temperature 101·4°. Swallows milk. 8 p.m.—Breathes heavily. Respirations 36, pulse 136, tempera-

ture 102°. Tremors of right arm, lasting a few seconds; can use it. Tremor of right leg. 9 p.m.—Pulse 160, respirations 40, temperature 101·4°. Dressed under spray; dressing soaked through with watery slightly blood-stained fluid. Movement of the head causes tremors of right arm, and evident pain. 12 p.m.—Pulse 160, respirations 40, temperature 102·4°. Eyes still deviated to left; breathing heavily. Enema of egg and milk retained.

Dec. 1, 4 a.m.—Pulse 160, respirations 40, temperature 103·6°. Gr. ij antifebrin, did not swallow it; urinated into the bed. 8 a.m.—Pulse 168, respirations 44, temperature 103°. Left pupil has been contracted some hours; right dilated. Left side of face hot and flushed; right cheek cold. Right arm stiff, adducted at shoulder, extended at elbow, extended at the basal joint of the index, flexed at the further joints. 9.30 a.m.—Enema, with antifebrin gr. ij; and again at 11 a.m. 12 noon. —Pulse 152, respirations 36, temperature 103·6°. Wound dressed, still abundant watery discharge; slight left external squint; swallows liquids. 4 p.m.—Pulse 136, respirations 36, temperature 104°. Has had gr. ij antifebrin every hour. Left squint gone; slight right external squint; eyes widely open; right cheek hot, left cold. 9 p.m.—Temperature 103°. Has had antifeb. gr. ix, in three doses. Wound dressed; inner end of drainage pushed up close under cranial vault; probe passed along it, does not enter a large cavity, but impinges against soft substance; little sanious fluid runs out. Tube replaced by a smaller one.

Dec. 2, 1 a.m.—Pulse 132, respirations 27, temperature 104·4°. Left side of face flushed in patches; urinated; antifebrin gr. iv given. 2 a.m. —Temperature 104·2°; gr. iv repeated. 5 a.m.—Temperature 103°. 8 a.m.—Temperature 104·4°, pulse 146, respirations 29. Left cheek very hot, right cool. 10 a.m.—Temperature 103·8°; has had three doses of 4 grs. of antifebrin, one every hour. Wound: œdema of all the back part of the scalp, with tenderness; prominence with elastic tension of the flap over the trephine hole; the drainage tube spontaneously rises out of its track; re-introduced. No sugar or albumen in urine; swallows well. 12 noon.—Pulse 128, respirations 28, temperature 101°. Cheeks pale and cool; pupils nearly equal, slightly turned to the left. 3 p.m.—Temperature 100·4°, pulse 136, respirations 24. 6 p.m.—Temperature 102·4°. Both arms relaxed; left pupil dilated; right contracted; both cheeks cool. 8.30 p.m.—Temperature 103·6°. Pupils equal; taken 20 oz. of fluid in the twelve hours; wound dressed; antefebrin gr. iv given. 12 p.m.—Pulse 136, respirations 28, temperature 99·8°.

Dec. 3, 2 a.m.—Temperature 104°. Right eye nearly closed, left half open; eyes directed to the right; antifeb. gr. iv given. 4 a.m.—Pulse 160, respirations 40, temperature 105·8°. Face flushed in patches; antifebrin gr. iv given, but was vomited. 6 a.m.—Temperature 104·2°. Quivering of the whole body for a few seconds; face flushed; pupils contracted; bowels moved. 10 a.m.—Pulse 136, respirations 36, temperature 101°. Swallows not so well; wound dressed; tube removed and not replaced; small hernia of apparently blood clot; œdema with tenderness over back of head; slight redness around the wound. 12 noon.—Pulse 144, respirations 40, temperature 101·4°. Swallows well; eyes central again, after deviation to left. 5 p.m.—Temperature 104·2°, pulse 160,

respirations 44. Antifeb. gr. iv; wound dressed; redness less; protrusion little more marked; cannot swallow. 6 p.m.—Temperature 103·6°. Left cheek hot, right cold; eyes turned to left. 7 p.m.—Temperature 102°. 8 p.m.—Temperature 103°. Both cheeks cold; antifeb. gr. iv. 9 p.m.—Temperature 104°. Urinated, and bowels opened; nutrient enema given, with antifeb. gr. iv.; right eye moving, left quiet. 12 p.m.—Temperature 104·8°. Injection of antifeb. gr. iv; right cheek cold, left hot.

Dec. 4, 2 a.m.—Pulse 180, respirations 50, temperature 105·4°. Lower jaw stiff; twitching of left hand. 4 a.m.—Temperature 105·4°. Enema of antifeb. returned. 7 a.m.—Temperature 106·4°. Deviation of eyes to right; perspiring. Has had two enemata of antifeb. g. iv. 8 a.m.—Temperature 108·4°. Died at 9 a.m. He did not recover sufficient consciousness after the operation to speak, although until the last day he was quite sensitive to irritation anywhere, and would move his hand towards the place touched. He was sponged every hour during the first two days, and then packed in wet towels every hour till death.

Post-mortem, six hours after death. The measurement of the head was found to be twenty-four inches in circumference, and sixteen and a half inches over the vertex from one external auditory meatus to the other. The centre of the vertex was eight and a quarter inches from each aperture of the ear; so that although the bulging on the right side of the head was apparent to the eye, it was not measurable. The trephine wound was four and a half inches vertically above the aperture of the right meatus, and obliquely four and a half inches above and behind the right external angular process of the frontal, and three and a half inches from the sagittal suture. There was some œdematous infiltration of the back of the scalp, and in the right temporal region. There was a slight hernia of blood clot. The flap was not adherent to the cranial bones. The skull was considerably thinned; the trephine wound had perforated it where most attenuated. None of the sutures had separated. The dura mater was rather more firmly attached than usual; especially was this the case on the right side, from above the trephine wound to the petrous portion of the temporal. On opening the dura mater, a consistent layer of buttery lymph covered the brain throughout, while a thinner watery fluid was in considerable quantity. The dura mater could be easily removed from the brain beneath, except at a spot on the right side, about two and a half inches below the trephine hole. Here it was firmly adherent to the subjacent parts, and an attempt to separate it with the scalpel opened the cyst cavity, with the fibrous wall of which it had intimately coalesced. The cyst presented on the right side of the brain, on the outer and on the inferior aspect, where over an area of about four inches by two it was uncovered by brain substance, and was translucent, but tough and membranous. This part seemed to be in the Sylvian fissure. Posteriorly, it was adherent to the temporo-sphenoidal lobe, which it very slightly overlapped, and had pushed backwards. On the cerebral surface, the Rolandic fissure, the ascending parietal and ascending frontal convolutions, and the first, second and third frontals were quite distinct; but they were displaced upwards, so that the lower extremity of the fissure of Rolando was situated nearly four inches vertically above the end of the temporo-

sphenoidal lobe. The third frontal convolution was not perfect at its lower part, for in the posterior extremity of this, at a spot about an inch and a half in front of and below the lower end of the fissure of Rolando, was the perforation made at the operation. Here the brain tissue was not more than an eighth of an inch thick. Below this point, and behind it, there is scarcely any brain substance. In front, the brain tissue gradually thickened from the thinnest pellicle, and so also towards the junction of the outer and inferior surface of the frontal lobe. On examination of the interior of the sac, it was found to be lined throughout with a continuous tough fibrous membrane, completely shutting it off from all the cavities of the brain. It had been opened at the operation almost at its highest point. It was discovered to have hollowed out the anterior end of the brain. The brain tissue above it was fully an inch in thickness; along the front surface, about half an inch; along the median aspect, where the frontal touches its fellow, about a quarter of an inch; along the inferior external margin, about half an inch, thinning out on the external surface and the orbital surface to nothing, as it passed backwards. The diameter of the cyst was about four and a half or five inches.

The finger in the cyst passed backwards and downwards, apparently into the substance of the right temporo-sphenoidal lobe, which appeared to be hollowed out, as well as displaced downwards and backwards. On tracing up the Sylvian or middle cerebral artery, it was found to pass on the inner side of the cyst; that is to say, the sac of the hydatid lay between the dura mater and the Sylvian artery, and could be felt hollowing out the temporo-sphenoidal lobe for a full inch and a half posterior to the line of the artery.

The hydatids evacuated consisted of a considerable amount of thick gelatinous translucent mother-cyst, studded with opaque, white, elevated, closely-set spots. These under the microscope, appeared to be mammillated projections of the same laminated texture as the rest of the membrane, and did not display any differentiated structure. There were numerous daughter-cysts of various sizes, up to that of a small walnut. There was also noticed, among the first products in washing out the cavity at the operation, before the removal of the mother-cyst, a mass of fibrous flocculent material, containing very minute cysts, and in which a gentleman present suggested a resemblance to the choroid plexus. It could be spread out as a thin, tangled-looking membrane. The microscope revealed no areolar tissue nor epithelial elements, but tangled threads of homogeneous material matted together, in places enclosing, and at others bearing on their surface, microscopic cysts of various size. These had walls of homogeneous tissue, sometimes displaying finely concentric laminated structure throughout; at others, and this generally in the larger ones, only at the circumference; while the interior was granular, or contained large oval dark granular bodies, with an almost black eccentric spot. Some were apparently minute daughter-cysts, without any, or with only liquid, contents; others contained formed elements, presumably scolices. There were, in other parts, easily recognised brood capsules, with scolices in varying numbers in their interior, or projecting singly or in masses from their exterior, or with nipple-like protrusions from their circumference. Hooklets and granular matter in abundance were dispersed over the whole field.

The foregoing case is recorded, and brought under the consideration of the Congress, as being the first in which a diagnosis of probable hydatid has been made, and its complete removal effected by operation.

The diagnosis in the present case lay between effusion into the ventricles, hydatid cyst, solid tumour, and abscess.

In favour of hydrocephalus, was the history of a very large head from infancy; but against it were the absence of all symptoms till seven months ago, their rapid progress since that date, the elevated temperature, the one-sided paresis, and the unilateral bulging of the head.

In favour of hydatid, was the asserted increase in the size of the head of late, the unilateral pain, the unilateral bulging, the one-sided paresis, the duration of seven months. The age of the patient was consistent with this supposition. In Dr. Thomas's list of cerebral hydatids, read at the session of the Congress held in Adelaide, of the cases in which the age is given, none occurred up to seven years of age, twenty-two between the ages of seven and fifteen, and only twenty-two during all the other periods of life. The situation, too, favoured hydatid; for this is half as common again on the right side as on the left. The constant elevation of temperature was against hydatid, for in a previous case under my own care it was absent, as also in other recorded instances.

Intra-cranial sarcoma suggested itself, because of the signs pointing to the existence of some tumour. But sarcomata are by far most common during the fourth decade of life, and the bulging would be improbable if the tumour sprang from the brain tissue; and if it originated in the cranial bones, it would be less uniform, and give evidence rather of a thickening of these structures; the temperature also opposed this theory.

The diagnosis of an abscess would rest on the unilateral cerebral symptoms, and the persistent feverishness. But there was no efficient known cause for suppuration, for though there was a history of a fall, yet it occasioned no head symptoms at the time, and had occurred a long while before any such arose. Bulging of the cranium is not a characteristic of cerebral abscess.

Hydatid of the brain, therefore, seemed to furnish the most complete explanation of the case, and it was further just possible that suppuration of the cyst might be the occasion of the pyrexia.

The localisation was simplified by the protrusion of the skull on the right side, most marked at a point about four inches above the right auditory meatus. With this situation agreed three localising symptoms, namely, the paresis of the left arm, the paresis of the left face, and the pointing of the left index finger, with spasm of the left arm, in two convulsive seizures; these would indicate mischief about the ascending frontal, and the posterior part of the frontal convolutions.

From the position and connexions of the cyst, it probably originated in the lower and back part of the frontal lobe; in its growth it hollowed out this lobe, chiefly in an inferior and posterior direction. It thus pushed the three frontal convolutions upwards, as well as those about the Rolandic area upwards and backwards. It then appeared in the Sylvian fissure, and crossing over this, external to the middle cerebral artery, pushed the vessel inwards towards the centre of the brain. Growing backwards still further, it pressed against the temporo-sphenoidal lobe, displacing it posteriorly, and appearing to hollow it out,

down almost to its tip. The situation of the Sylvian artery seems to indicate that the hydatid developed in the frontal lobe, and crossed the fissure to the middle lobe; and did not originate in the brain substance in the Island of Reil, or between the two lobes, and then spread both forwards and backwards. In this case, the artery would most probably have been on the exterior surface of the cyst.

Death resulted from general cerebral meningitis. The layer of plastic lymph in the arachnoid sac was so extensive, thick, and consistent, that it is well nigh impossible for it to have originated subsequent to the operation, only four days before. Moreover, at the seat of operation, there was adhesion between the membranes and the thin layer of brain-tissue, practically preventing the opening of the arachnoid sac at this point. Again, the hydatid had not suppurated, hence some inflammatory mischief, such as a meningitis, must have existed prior to the operation to account for the persistent pyrexia. The supposition of meningitis explains also the acute pain experienced on moving, and on pressing the head, and the rapid retrogression in the patient's condition during the week preceding the operation. Hence, I conclude that a meningitis existed prior to my first visit, and simply progressed after the surgical interference, without being materially affected thereby, and accounted for the fatal issue.

NOTES OF A CASE OF HYDATID CYST OF THE ZYGOMATIC FOSSA.

By J. R. M. Thomson, M.B., Ch.B. Melb., York, Western Australia.

J. M., aged 56, came under my notice on the 26th October last, suffering from a tumour in the temporal region, of which he gave the following history :—Early last May he first noticed a "lump" about an inch from the outer border of the right eye; it gradually increased, till it attained its present size. It has never been painful. He has never had any stiffness of the jaw. As the lump increased in size, he began to notice a swelling inside the mouth, between the jaw and the cheek, opposite the back teeth.

On the 26th October, the condition is as follows :—There is a tumour occupying a space extending from about the centre of the temporal fossa to an inch below the zygoma, and almost from the ear to the orbit. It is very tense, and the skin covering it is shiny. There is no pain nor tenderness. I made an exploratory puncture with a hypodermic syringe, and drew off a few drops of turbid fluid, the needle being blocked with a piece of hydatid membrane.

On October 30th, I made an incision from one end of the tumour to the other. I had to cut through the temporal fascia, which was unusually tough. I then emptied the tumour, which consisted of a hydatid cyst crammed with daughter-cysts in all stages of development, living and dead. The zygoma was completely eroded for about half an inch from

its junction with the malar bone. The cyst extended deeply into the zygomatic fossa. The wound was drained, and treated in the ordinary way.

It seems remarkable that the growth of a hydatid cyst should have such force as to erode bone, while it had the opportunity of enlarging by expanding a softer structure; but it would appear, in this case, at any rate, that the hard unyielding bone was less resistent than the elastic fibrous structure of the temporal fascia. The choice of locality in this case is also peculiar, especially as its growth was evidently from the surface into the deeper structures. I have not been able to find a similar case recorded.

CASE OF MULTIPLE HYDATID CYSTS, TREATED BY THORACIC INCISIONS—RECOVERY.

By Joseph C. Verco, M.D. Lond.

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In view of the proposed discussion on "Hydatids," it was thought that the following case might be of interest, illustrating, as it does, the most recent method of dealing surgically with this disease. It is believed to be the only recorded instance where a radical operation has been performed through the chest wall upon separate cysts in two lobes of the liver, and also where a cyst, believed to be in the left lobe, has been deliberately operated upon in this manner:—

Charles D. C., æt. 14, was admitted into the Adelaide Hospital under the care of Dr. Verco, on November 24, 1886. His previous history was briefly as follows:—He was born at Robe, and when he was two years old his parents removed to Narracoorte, where he lived till he reached the age of thirteen years, both these places being situate in the south-eastern district of South Australia, where hydatid disease is very prevalent. When eleven years of age, he is said to have had inflammation of the lungs, from which he completely recovered. Shortly after removing to Port Adelaide, when thirteen years old, he is said to have had a second attack, which left him with a permanent cough. In March 1886, he had considerable hæmoptysis; and in June, an enlargement of the left side of the abdomen was noticed, which temporarily subsided after a second attack of hæmoptysis, which was accompanied by the expectoration of "skins." His medical attendant (Dr. Mitchell) came to the conclusion that he had ruptured a hydatid cyst of the lung. In August, however, the abdominal tumour reappeared, and subsequently increased in size rapidly, while the cough and expectoration of hydatid débris continued up to the date of admission.

On admission, he was described as being pale and emaciated, though not feverish, but the pulse was rapid, and the respirations were forty per minute, and shallow. He was unable to lie down in bed, as the cough was aggravated by the recumbent posture. The lower part of the chest was considerably bulged out on the right side, but on the left side the prominence was much more abdominal than thoracic. The lower border of the abdominal tumour could be traced from an inch below the costal margin in the right mammary line, to about two inches above the umbilicus in the median line, and to nearly the level of the umbilicus in the left mammary line. The hepatic dulness commenced at the fifth interspace in the right mammary line, the left front of the chest was dull on percussion below the third rib, and the whole of the left axilla was also dull. Posteriorly, there was dulness over both lower lobes of the lungs, more marked, however, on the left side, where it reached to nearly the angle of the scapula. Over these dull regions, the respiratory sounds were either much weakened or abolished. The cardiac apex beat was in the sixth space, rather outside the left nipple line, and the impulse could be seen and felt over a wide area. The pulmonary signs showed relative flattening and deficient expansion at the left apex; but on the other hand, impaired percussion resonance, blowing breathing, and adventitious sounds at the right apex, both in front and behind, indicating, in Dr. Verco's opinion, the existence of a cavity containing a ruptured hydatid cyst, and the source of the hæmoptysis and expectoration before mentioned. Dr. Verco further thought that the tumour of the left side of the abdomen and thorax was probably a pulmonary hydatid, and that the lower part of the right side of the chest was occupied by a distinct hydatid cyst, which might be either pulmonary or hepatic.

On December 24th, the left side was aspirated in the anterior axillary line, at about the level of the nipple, and ℥xv of clear hydatid fluid withdrawn. On December 31st, another slight hæmoptysis occurred, followed on January 5th, 1887, by the expectoration of a piece of membrane, together with ℥ss. of pus; another hæmoptysis is reported on February 3rd. On February 11th, the right side was aspirated in the eighth interspace, and ℥xlij of clear hydatid fluid drawn off. From the date of admission, he steadily improved in his general health, and when discharged on April 26th, the cyst did not appear to have refilled.

He was again an inmate of the hospital for six weeks, during the months of August and September 1887, and owing to the illness of Dr. Verco, was under the care of Dr. Lendon. During this time he had hectic fever; the cough and expectoration were considerable, and abundant râles were audible at the right apex. Hence it was doubtful whether he might not have phthisis in addition to the hydatids.

On November 8th, 1887, he was re-admitted under Dr. Lendon's care. The abdominal and thoracic physical signs had not altered much, but there was orthopnœa, and so considerable was the embarrassment of the breathing that, in spite of the unfavourable condition of his right apex, which it was still feared might possibly mean phthisis (for he had had a severe hæmoptysis a week before), it was decided, after consultation with Drs. Davies Thomas and Way, to operate. There was a difference of opinion as to the precise locality of the cyst which occupied the left side of the abdomen and thorax, but Dr. Lendon was inclined to

think that it was connected with the left lobe of the liver, rather than with the spleen or omentum, and certainly that it was not pulmonary; and moreover, that it would be better to operate upon this cyst first, in order, if possible, to relieve the dyspnœa, as it was much the larger cyst of the two, and for fear that it might be less accessible if the cyst on the right side (now presumed to be hepatic) were evacuated first. Accordingly, on November 20th, the boy was placed under the influence of ether, and Dr. Lendon proceeded to operate, with the assistance of the above-mentioned colleagues. After a confirmatory aspiration in mid-axilla, a portion of the ninth left rib was excised, the pleural cavity opened, and slight pneumo-thorax caused thereby. The diaphragm was incised, and the spleen which was presenting was retracted backwards, and the omentum lifted forwards. The cyst was now obvious, but quite inadherent; for certainty, it was again punctured with the aspirator needle, and then stout loops of silk were passed through in order to bring it up to the external wound, when it was freely incised, and the contents—slightly opalescent fluid, and an enormous mother-cyst—evacuated. The edges of the sac were stitched to the deeper structures of the wound, but not to the skin. A large drainage tube was inserted into the sac, and a smaller into the pleural cavity. Only modified antiseptics were employed, and on the fourth day the pleural tube, being blocked with solid lymph, was left out as being no longer necessary. Bile-stained serum was discharged through the large tube, which was left out on the ninth day after the operation. Very little constitutional disturbance followed the operation, the temperature being normal after three days, and a gradual improvement of the respiratory sound was noticed over the left back. The patient left for the Convalescent Home on December 20th, to recruit for the second operation.

On December 27th he was re-admitted, with the sinus discharging a considerable amount of bile, although a probe could only be passed in about one and a half inches. His general condition was still far from satisfactory. There were signs of active mischief at the right apex, and there were well marked hectic symptoms, but as the hepatic tumour had increased in size, so as now to reach quite to the umbilicus, Dr. Lendon decided again to operate. On January 12th, 1888, under ether, an aspirator needle was introduced into the right mid-axilla, and pus withdrawn. Part of the eighth rib was excised, and the pleura found to be partially adherent. The diaphragm was cut through, and the cyst seized and dealt with in the same manner as on the opposite side, five pints of fluid being evacuated. There was much less disturbance than even after the former operation, the pleural tube being left out on the fifth day, and the larger tube a few days later. The sinus on the left side finally closed early in February, and that on right side early in April, the boy having left the hospital some weeks previously (March 9th) in excellent health, excepting the persistent cough.

Dr. Verco had meanwhile resumed charge of his wards, and the patient was admitted for the fifth and last time on April 3rd, 1888, having been ailing for the previous week with pain in the right shoulder, and having coughed up about half a tumblerful of pus. He was found to be again feverish, but this was explained by the development of signs of fluid in the upper part of the right back, which an aspiration showed to be purulent. Accordingly, on April 6th, under ether,

Dr. Verco again explored the chest by an incision in the ninth right interspace, in the scapular line, without excision of a portion of rib. On introducing his finger into the chest, he detected the abscess bulging from above downwards; the aspirator needle was again inserted and used as a director, and the abscess freely opened, when a large quantity of pus was evacuated, without, however, any hydatid membrane or cysts; a drainage tube was then inserted. It was evident that this collection of pus was contained in the upper part of the chest; and it is probable that it was connected with the cavity at the right apex, as the signs of activity in this cavity soon disappeared. This last sinus healed about the end of May, after the patient had left the hospital, and from this date all dyspnœa, cough, and expectoration ceased entirely. Since June, he has been at work as a clerk.

On Nov. 17th, 1888, he was examined by Dr. Lendon, who found him to be in robust health, and free from cough, dyspnœa, or expectoration, although at the right apex there were marked signs of consolidation (deficient expansion and percussion resonance, bronchial breathing with prolonged expiration, and increased resonance on speaking and whispering), more evident in front than behind. There was no abdominal enlargement, and the hepatic dulness was normal in its limits; the cardiac apex beat was in the normal situation, but the impulse was diffused over an extensive area. The whole chest, with the exception of the right apex, expanded remarkably well, and the other physical signs were, roughly speaking, normal, excepting that the breath sounds were weak at each base posteriorly. The wounds were all soundly healed, but the skin was puckered and adherent to the periosteum, which had formed new bone, so that it would have been difficult for one unacquainted with the case to believe that so extensive excisions of ribs had been practised.

TREATMENT OF HYDATID DISEASE BY INJECTION OF PERMANGANATE OF POTASS.

By W. P. Whitcombe, M.R.C.S.E.

Amongst the many and different methods of treating hydatid disease, it has long seemed to me that some means of destroying the walls of the cysts (both parent and daughter) was much required, having, of course, due regard to the safety of the patient. But it was not till May 1885 that I became acquainted with any solvent for them. In a paper read for me before the Victorian Branch of the British Medical Association, I described a case of multiple hydatid, occurring in my hospital practice, which quite as a *dernier ressort* I treated by laparotomy, the case proving fatal. During the operation some three gallons of cysts were removed, and at the post-mortem examination, some two gallons more were taken from different parts of the abdomen. Thus we had an excellent opportunity of seeking for an agent capable of acting as a solvent. Our then resident surgeon directed the dispenser to try and

find something which would thus act, and in a few days, after trying many different things, he discovered that a solution of permanganate of potass had this power, and since then it has been my common practice to inject solutions of this salt into hydatid cysts containing, as is often the case, large numbers of daughter cysts, and as a rule with good results. In illustration of this plan, I will give a short *resumé* of the last case treated by me in this way :—On 22nd July, 1888, I was called to see J. G., æt. 24, by occupation a letter-carrier, previously a healthy man. He was feverish, and complaining of pain and tenderness in left hypogastrium. After a few days' attendance, the pain being somewhat relieved, I diagnosed a large hydatid cyst in left wall of the liver. This I aspirated, but could only obtain a few drachms of the characteristic fluid, the parent cyst being literally crammed with daughter-cysts. On 2nd August, I tapped with a large trocar, leaving the canula in the wound, and introducing through it a drainage tube. Through this but little fluid escaped, and therefore in about three days I commenced injecting solutions of potass permanganate at first, but very little could be forced in. This was repeated every other day for about a fortnight, the result being that by the end of the month the whole of that cyst and its contents were dissolved, and had come away, leaving a small unhealed sinus. It was then found that there was another cyst in the right lobe of the liver. This was treated in like manner, and in about three weeks this had also come away, also leaving a sinus. These sinuses were perfectly healed by 11th October, and the patient went to the seaside for change of air, returning to his duty by the end of November. Such has been the plan I have pursued during the past two years. I have always endeavoured at first to evacuate the cyst by simple tapping, with or without aspiration, as I have found that this treatment has been sufficient to effect a cure in the majority of cases met with—I think I may safely say in all cases where the cyst has been simple, and not containing any daughter-cysts. And I am now convinced that, in the injection of a solution of permanganate of potass, we have an agent which will in almost all the severer cases destroy the cysts, without the slightest danger to the patient, and will thus effect a perfect cure.

UPON THE OCCASIONAL PRESENCE OF BILIRUBIN IN HYDATID CYSTS.

By John Davies Thomas, M.D., F.R.C.S.

On October 17, 1888, I operated by abdominal section upon an enormous hydatid of the abdomen in a man aged 25. When the abdomen was opened, it was found that it was nearly filled with a huge echinococcus cyst. The fibrous sac was inseparably adherent to the abdominal wall in front, whilst posteriorly it seemed to line the abdominal parietes, so that it was a mystery where the intestines lay. It also reached to the bottom of the pelvis, between the rectum and bladder, both of which must have been compressed.

Above, its upper limit could be reached with the finger, at about the margin of the thorax, on the left side of the median line; but on the right, the sac extended to the under surface of the liver, far beyond the reach of the finger. I felt assured that the parasite had originated at the under surface of the right lobe of the liver, and had grown downwards to the pelvis, almost entirely filling the abdomen. The mother-cyst was dead, and had been ruptured before the operation. It was also stained deep green, apparently from bile. The daughter-cysts, which were present to the number of thousands, were of all sizes, from that of a large pin's head to that of a medium sized apple. The majority contained clear transparent contents, and were tense and plump; but a great number were flaccid, collapsed, with opaque walls and puriform (not purulent) contents. They were for the most part unruptured. Inside many of these dead, but still entire, daughter-cysts, I found flakes of matter resembling in colour red sealing-wax, but of soft consistence.

Upon microscopic examination, I found that the flakes in question consisted of a collection of ruddy crystals, having the fundamental shape of oblique rhombic prisms. Some were present as isolated crystals, but the majority were accumulated into irregular masses, in which, however, it was easy to recognise the forms of the component crystals. Mixed with these coloured crystals were acicular fatty crystals and numerous oil globules of all sizes. The latter were, no doubt, products of the degeneration of the cyst contents.

The quantity of the red matter procurable was very small, so that a quantitative analysis was impossible; but it possessed the following chemical characters:—Insoluble in water and in cold alcohol; soluble in ether, and very readily so in chloroform; from the chloroform solution there were deposited, by the volatilisation of the solvent, small oblique rhombic prisms of yellowish-red tint, quite like those found in the original red matter, and acicular crystals apparently of some fatty acid, as well as rhombic plates of cholestearin; both the latter were colourless. The chloroform solution gave the distinctive colours of bile pigment with Gmelin's test, and this was particularly well marked upon the addition of chloroform containing a trace of free chlorine. Spectroscopically examined, the solution was found to extinguish to a great extent the blue end of the spectrum, but there were no absorption bands in the rest of the spectrum. Examination by polarised light showed the crystals to be double refracting.

From the preceding data, it is clear that the matter in question was bilirubin. I must acknowledge with thanks the kind assistance given me by Professors Rennie and Bragg, as well as by Dr. Whittell, in determining this point. The presence of bilirubin has been previously noticed in connection with hydatid cysts. For example, Bristowe (Path. Soc. Trans., Vol. IV., p. 166) mentions a case of degenerated hydatid in the left lobe of the liver, in every part of which numerous vermilion spots were found. These spots consisted of colourless plates of cholestearin mixed with ruby-coloured, more or less regularly rhomboidal, crystals.

In June 1886, Dr. Springthorpe read a paper before the Medical Society of Victoria upon an interesting case, in which a very large

amount of this body was found in an abdominal cyst. It is not clear to me whether this cyst was originally of hepatic origin or not, and this important point does not seem to have presented itself to the writer of the paper. Apparently, however, the cyst in point was not considered to have taken its rise from the liver, for Dr. Springthorpe evidently attributes the presence of the bilirubin to altered blood effusion ; but, as he remarks (p. 254, *Australian Medical Journal*, June 15, 1886) it would require about thirty ounces of blood to yield this quantity of pigment, and this loss of blood could hardly fail to assert its occurrence by marked symptoms. In my own case, there could be no doubt that an effusion of bile had taken place into the sac, and had not only killed the mother-cyst, but had also passed by endosmosis into many of the daughter-cysts, destroying them also. In process of time the colouring matter of the bile was precipitated as bilirubin in the interior of the daughter-cysts invaded. I believe that some flakes of bilirubin were present free in the mother-cyst, but of this I cannot be certain, for daughter-cysts may have ruptured during the operation, and so have given rise to what appeared to be flakes in the mother-cyst.

DISCUSSION ON HYDATID DISEASE.

A discussion was then instituted ; and on the suggestion of the Chairman (Dr. Stirling), it was agreed that, as far as possible, seeing that so little time was available, the speakers should confine themselves to questions concerning the surgical treatment of hydatid disease.

Dr. Sydney Jones (New South Wales) said :—I have listened with intense interest to the papers which have just been read, and particularly so as to the surgical treatment of hydatids. We in New South Wales do not see hydatids so frequently as our favoured brethren in South Australia, still the disease in our colony is not infrequent ; and there, as elsewhere, the most favoured localities for the disease are primarily the liver, and secondarily the lung. I do not propose to occupy your time in discoursing on the various methods of treatment which have been adopted by myself in New South Wales in years gone by ; I should simply like to record what is the ultimate opinion at which I have arrived after consideration of cases that have come under my observation for many years past. I may say that my methods of treatment, and those, I think, of my fellow practitioners, dwindle down to two—first, aspiration ; secondly, direct incision, with stitching of the sac to the parietes. I am not disposed to give up aspiration *in toto*, as I think the tendency of the papers which we have just heard would induce us to do. I cannot shut my eyes to the fact that in years gone by I have operated upon scores of cases of hydatids of the liver by simple aspiration, and I have every reason to believe that, in the vast majority of those cases, an absolute cure has taken place. At any rate I have lived long enough, having been in practice twenty-five years, to have had frequent oppor-

tunity of watching the cases that were operated on by me many years ago, and it is only within the last six months that I saw two of those cases, and from the time of operation up to the present day, not a solitary sign or symptom of hydatids had occurred, and I do not think it is fair to say that the cyst itself may refill after an interval of ten years. Who shall say, when such a thing occurs, that there is not a formation of a fresh hydatid cyst? Who is to pronounce that such a thing is not possible, nay even probable? Then, Sir, the conclusions at which I have arrived, and which I now express, are that in all cases of hydatid cyst, other than those of the thoracic cavity, which I exclude for the present, our first duty is simple aspiration. In a large number of cases, of course, we shall be unable to draw off any quantity of fluid that will have any material effect on the vitality of the parasite. Those are cases in which the parent cyst is completely packed with daughter-cysts. Such cases as those have occurred to me pretty frequently, and I must say, much more frequently of late years than they did in previous years. In such cases as that, of course, simple aspiration will be perfectly useless, and if I find such a result, I am prepared at once to proceed with the operation of cutting down and stitching the sac to the parietes, and opening and draining in the usual way, evacuating all the daughter-cysts, and washing out, and inserting a very large drainage tube; but as I said before, those are cases that one will meet with every now and again, but there are other numerous cases in which one will be able to evacuate two or three pints of clear hydatid fluid. I am confident that, in the vast majority of such cases, an absolute cure will result. I am fully aware of the risk of aspiration in thoracic cases, and I therefore have some hesitation in aspirating such cases because of the risk, which has been so well pointed out by Dr. Thomas, of rapid suffocation, which is the special risk to which those cases are exposed; still, if I have a case where there is distinct bulging of the thoracic wall, I should not hesitate for one moment to use the hypodermic syringe, which I think we ought to use in more instances than we do, and withdraw a portion of the contents of the cyst. Finding it to be hydatids, I should then consider it my duty to cut down and stitch the pulmonary and parietal pleuræ together, and open and drain in the usual way. I have discarded altogether the other operations which have been referred to, such as retained canula, caustics, injections, and all such like. I think the whole thing is narrowed down to the two operations which I have just described, and I think it will be of infinite regret to us all, if we discard the simple and almost perfectly safe operation of aspiration. I say perfectly safe from my own experience, because not a solitary death has ever occurred in my practice from simple aspiration.

Dr. Rendle (Brisbane) said:—Although I cannot boast of a very large personal experience of hydatids, yet I was very anxious to have an opportunity of saying a few words on the subject, and this morning, when I spoke to a friend, saying that I was coming here to listen to the papers on the subject, he said "That is a well-worn subject; there is nothing new on that." I am very glad to say I was not of that opinion, and I am still less of that opinion, now that I feel that I have learnt a great deal in listening to the papers which have been read to-day; and I think the great lesson, in spite of what my senior, Mr. Sydney Jones, has said, that most of us, if not all, will take away

from this meeting to-day, is the great importance and the great advantage of the treatment by free incision and drainage. I think no one can forget the large number of cases where putrefaction occurs, and this is one of the greatest dangers in the treatment of this class of disease. No doubt we are able to protect ourselves from that more by operation and free incision than by any other operation, however careful we are in the process of aspiration. There can be no doubt, although we do not introduce any foreign element, yet the very fact of the beings dying after the operation shows that they themselves are a source of putrefaction, and consequently of danger to the host. Another great advantage of the operation by incision is, that one is better able to see where one is going, and better able to regulate the size of the operation according to the need as it arises, and a greater freedom from injury to the intestines and other structures, and a greater certainty of confirming our diagnosis, before we have gone too far in our treatment. Another thing that struck me was the condemnation of the subsequent injection. I could not understand why that was condemned; and I was very pleased to hear Dr. Thomas explain that it prevented the collapsing of the cyst, and the occurrence of adhesions, both of which circumstances are so desirable. With all due respect to Dr. Sydney Jones, I think it would more satisfactory if, instead of making sweeping statements about the treatment, he had brought a few statistics of his cases to show the actual number that have really recovered, and the time of observation after aspiration, and also the number of cases in which putrefaction has or has not occurred.

Mr. FitzGerald said that the subject of hydatid disease had always been of great interest to him, and that his interest had not diminished, but rather increased, during thirty years of practice. He had not intended to speak, but on some points he could give definite information. Firstly, it was questioned whether tapping effected a permanent cure. Over twenty-five years ago, a lady in Melbourne came under his care suffering from gastralgia. He diagnosed the case as one of hydatid of the liver, and with difficulty obtained the patient's consent to paracentesis. Dr. Bird was present at the operation. The aspirator was not used, simply the ordinary trocar. Between ten and twelve ounces of fluid were removed. The patient lost all pain. Five years later, she died of apoplexy. A post-mortem examination was obtained. The mother cyst was found rolled up in the collapsed adventitia, but not adherent to it. He had seen many cases subsequently, which showed that when simple tapping was performed with success the sac contracted to very small dimensions, and then frequently remained permanent, with relics of the true echinococcus structures encapsuled within it. He almost always tapped in the first instance, but seldom used the aspirator. Aspiration, when pushed too far, had, within his knowledge, caused death by hæmorrhage. He remembered only one case in which simple tapping caused death. That occurred twenty-six years ago, in the Melbourne Hospital, in a patient under the care of the late Dr. Wilkie. The hydatid was deep in the liver, and long trocars were not then in general use. A short trocar was inserted without result. Dr. Wilkie objected to the use of a longer instrument; death ensued. At the autopsy, it was found that the sac had been penetrated, but the mother cyst had been pushed inwards by the trocar, and separated from the adventitia; hæmorrhage

had occurred into the space so formed. He had seen no other case in which death could be attributed directly to tapping. Undoubtedly, tapping frequently revealed the presence of multitudes of daughter cysts. Free incision and thorough drainage were then required, and death often followed the neglect of these procedures. But, even in these difficult cases, the preliminary tapping did no harm, while in the simpler cases it sufficed for a cure. Surely then, it was not correct surgery to neglect an operation attended with no danger, which was thoroughly effective in a large number of instances, on the ground that in a minority of cases it needed supplementing by incision, evacuation, and drainage. During the discussion, reference had been made to symptoms of shock after tapping. In one instance, he was treating, in conjunction with Dr. Bird, a case of multiple hydatid. The patient, a man from Queensland, was over 70 years old. The abdomen was full of cysts. One after another was tapped and emptied, till a cyst over the great end of the stomach was punctured. Pulse and breathing at once ceased, and the patient fell as if dead. He lay in a trance for eleven days. Probably some great sympathetic reflex had been excited. However, he gradually recovered, and years later had no sign of hydatid disease. He (Mr. FitzGerald) further said that, when he determined to incise a hydatid cyst, he inserted a number of hare-lip pins, so as to secure adhesions. If the abdominal wall was flaccid, he pinned the cyst to the wall ; if it was thick, he simply inserted the pins into the cyst cavity ; if the cyst was tense, he drew off a small quantity of fluid in the first instance. He left the pins in for twenty-four to forty-eight hours, though adhesions were in reality obtained in five or six hours. It was nearly fifteen years since he first incised and removed the whole parasite. But he insisted that this larger operation should be restricted to cases requiring it. The recovery after simple tapping was sometimes startling in its rapidity. About seven years ago he saw, with Dr. Williams, a case of large single cyst of the liver. Eight pints of fluid were removed. Within fourteen days, the patient was in the saddle in the hunting field. Two years later the patient reported himself, and there were no signs of hydatid disease. Eighteen years ago, a railway porter presented himself with partial right hemiplegia, pain in the right arm, bulging and intense pain around the left ear. The finger in the ear detected slight crackling and semi-fluctuation on pressure. Eight ounces of fluid were withdrawn with a fine trocar. Complete recovery followed.

Dr. S. D. BIRD said that it had fallen to his lot to see a large number of hydatid cases dating as far back as 1861, when he saw, in the Melbourne Hospital, the late Dr. Motherwell and Dr. Hudson (now present) tap many such in the liver, with the ordinary fine trocar and canula, with perfect success ; and he was informed by those gentlemen that they had heard no complaints of recurrence in the great majority of cases. A good example, amongst hundreds that might be quoted, of the efficacy of simple tapping, was that of a little girl from the Western district, who was so treated by Mr. FitzGerald and himself for a cyst in the liver in the year 1872, with complete recovery as usual ; but the following year a cyst in the right lung made its appearance, which was treated in the same way with the same result, and some years afterwards, the young lady when presented at Court caused a notable

sensation by her remarkable beauty. Sometimes violent convulsive cough, with expulsion of membranes and blood, followed tapping the lung, and even pneumo-thorax, but he had never seen death or permanent injury, or indeed any other result than cure follow this treatment. On the other hand, the use of the aspirator was distinctly dangerous. Several sudden deaths had been caused by it, even in the most skilled hands; and it also hindered, instead of aiding, the emptying of the cyst, by sucking portions of membrane into the canula, thus giving rise to delay and trouble. For old suppurating cysts of the lung, a different treatment was required. In all probability, adhesions to the chest wall already existed, and all that was necessary was to introduce the largest trocar and canula that would pass between the ribs, leaving the latter in for a few days, and frequently washing out with antiseptics. The wound being now freely enlarged laterally with a probe-pointed bistoury, the whole of the parasite was easily removed with a little assistance, and a radical cure was effected. He had never found it necessary to resect any portion of rib, though some of the cysts had been of enormous size, and weighed over a pound after removal. In none of these cases had there been septicæmia, or any warning of it; the constant result had been radical cure in about three weeks, though sometimes separation of the cyst wall from its nidus was delayed much longer than this. So far from hydatid of the lung being a difficult disease to cure, he had found it more safely and readily curable here than in any other internal organ —except, perhaps, the liver—provided the treatment was not hurried, and the aspirator was not used. He had reported a great many of these cases in the *Australian Medical Journal* in past years, but of late had not done so, as he had nothing new to tell—all the cases ending in the same way. The only cases, in his opinion, in which immediate cutting operations for hydatid within the thorax were justifiable, were those in which the parasite occupied the cavity of the pleura, either by rupture from the lung or elsewhere, or by primary development. These were much more serious cases. Many years ago, he removed a large cyst which had burst from the lung into the pleura, leaving a fistulous opening and pneumo-thorax; complete recovery followed after a prolonged course of treatment; but some months afterwards, during an attack of pneumonia from exposure, the fistula re-opened, and after a tedious illness the patient died of exhaustion. Primary hydatid of the pleura was very rare; he had only seen two cases, in both of which, after operation, a secondary development of hydatid took place in the pericardium, and of course caused death. If adhesion to the chest wall did not exist in an old suppurating hydatid, his practice had been to tap with a moderate-sized trocar, and leave the canula in for a few days, when adhesion was sure to form. His experience of these plans of treatment of lung hydatid (and the same was equally applicable and successful in the liver), led him to entertain very grave doubts as to the propriety and safety of primary cutting operations in non-suppurating cysts, involving such serious procedures as resection of ribs, incision of sound lung, stitching of pleura, and so on, recommended and practised by Dr. Gardner. In fact, it seemed to him that the same criticism was applicable here as was made by the French on the Balaclava charge. They said of it:—"C'est magnifique, mais ce n'est pas

la guerre!" which we might paraphrase by allowing that such operations were bold in design, and in Dr. Gardner's hands no doubt brilliantly performed, but were they sound or prudent practice, when the experience of hundreds of cases in this colony show us that we have other means of cure, slower indeed, but just as sure, and entirely devoid of risk?

Dr. NICHOLSON (Benalla) said:—In the main my experience as a private practitioner completely coincides with that of Dr. Jones, of Sydney, and with those who believe that aspiration is the safest, and by far, in the majority of cases, the best treatment for these cases so far as at present known. I, as a country practitioner, have an opportunity of watching many of my patients during a good many years, having lived twenty-five years in this colony. I also have had the history of cases which have been operated on by Dr. Bird and Mr. FitzGerald, that fully bear out the view, that in by far the majority of cases the aspirated hydatid does not return. I wish to say I have a method of treatment, which I desire to lay before you—a new method, I think. I wish to peptonise those things, and produce an easily diffusible peptone, and so remove them from dangerous places where the knife could not reach them. I look upon the hydatid cyst as simply no more nor less than a perfect dialysing apparatus, and it takes from the blood the saline materials. Some say there is no such thing as absorption in this connection. I have seen cases treated by Mr. FitzGerald with iodides, and I have analysed fluid from those cases, and have invariably found iodine; but in the very last case I had, of which I have the analysis in my hand, the patient was taking nitrate of potash, and to such an extent was the hydatid fluid permeated by the nitrate of potash, that the dried extract would burn like tinder. As I said before, my method is simply to render the contents of the cyst soluble, or dialysable, by the injection of acidified glycerine solution of pepsine.

Dr. BATCHELOR said:—I should like to say a few words on this subject, because we have a good number of cases in New Zealand. I think the statistics read really prove very little about the operations, but rather show the valuelessness of statistics; because from what I have heard, I certainly judge that some cases, where the puncture has been performed, have been picked out indifferently, whereas the operations have been performed by skilled surgeons; and if Dr. Gardner punctured a hundred cases, and incised a hundred cases, I think he would find that his results from puncture would bear very favourable comparison with the other. As to the question of washing out the cavity, I quite agree with Dr. Thomas, if the first incision is done thoroughly, and the wound is kept aseptic, I cannot see what advantage you get by washing. Of course, if you allow germs in, you must wash them out; but once get the wound aseptic, the same rule applies to this as to empyema. Such washing is objected to by the best authorities; and if it applies to the thoracic cavity, how much more must it apply to the abdominal walls. As to incision of the chest, I take an entirely different view from Dr. Thomas. He says, I understand, that in cases where there is dulness on the surface, and the sac is near, in that case he would incise. Well, I should say that I should puncture that case, because you do not go through lung tissue at all; but if you pass through lung tissue where the air gets in, it seems to me you have a very ready mode

for the cavity being infected. On the contrary, I should feel inclined to incise where the cavity was in the interior of the lung.

Dr. Charles Smith said:—I wish to bring before the Congress a method of treating hydatid of the lungs, which I have tried in two instances with success, and although so small a number of cases does not justify a general conclusion, I think the principle is good, and that further treatment of the same kind is desirable in the interests of patients and of science. The method I speak of is what is called the desiccating method, when applied, as it has long been, to the treatment of pleuritic effusion. I deprive the patient of all fluid for twenty-four hours, except the small quantity given with the medicine. During the next twenty-four hours I allow half a pint only, and if the patient can be kept to this for five days, I do so, but a good deal of determination is required on his part. At the same time, I give half a teaspoonful of common salt in half a wineglassful of water every four hours, not with the idea of acting directly on the hydatid, but with that of increasing the density of the blood, and thereby aiding the rapid desiccation of the cyst; or I use pot. iodid. instead, but with the same effect. In one case, the hydatid was expectorated four weeks after the treatment was used; in another, the expectoration of the cyst commenced the week after; and this, I believe, was not simply a coincidence, for the case had been some months under my observation, and was not a very large one. There were special reasons for deferring an operation. I hope that others will give this method a further trial, as I intend to do, and that they will report the result. If successful in the case of the lungs, it may prove to be so also in that of other organs; but in my two cases, the cysts were expectorated. Whether simple drying up may occur in other cases, remains to be proved. The rapidity of the desiccation is an important element in the method—another branch of the subject. I have had an opportunity of tracing the gradual growth of a hydatid cyst from its very commencement, until it reached the capacity of about two quarts. It was in the breast, and therefore free to grow without any great pressure, and the time occupied was ten years. I think, therefore, that in ordinary situations, a cyst of the size of an orange would be of two years' growth. In the first case treated, the patient continued the salt and water for nearly forty-eight hours, when it had to be discontinued on account of tendency to vomit; the deprivation of fluid was continued. In the second case, where pot. iodid. was given, gr. v were given every four hours, and continued for five days, and afterwards three times a day for several weeks. In future cases I shall prefer the pot. iodid., as it does not cause vomiting. In other respects, the diet is as usual, as much dry food as is desired being allowed.

Dr. Springthorpe said that he desired to bring forward two points of some importance. Firstly, the necessity for some concerted preventative measures. In 1885, he urged the importance of some action upon the Central Board of Health in Victoria. The outcome was the issue of an instructive leaflet, of which some thirty thousand were circulated throughout the colony. No doubt, much good followed the dissemination of the information therein given, but much remained to be done. He urged that this Congress should bring under the notice of the different Governments, the necessity for taking preventive measures, by the inspection of dogs in the more infected areas, &c.

Secondly, he drew attention to the difficulty, if not the impossibility, of diagnosing hydatid fluid in the absence of hooklets, scolices, and membrane, from some forms of ovarian fluid. The low specific gravity, the absence of albumen, and the presence of abundant chlorides, are not diagnostic of hydatid fluid, they characterise also the fluid of parovarian cysts. Of this, he gave two examples; one was mistaken for hydatid, the other was correctly diagnosed—both were parovarian cysts. Case 1.—Fluid slightly alkaline, sp. gravity 1002·2; chloride of sodium, &c. 7·4 in the 1000; no albumen; mucilaginous matter also present. Case 2.—Fluid alkaline, sp. gravity 1011; chlorides, 6·75 per 1000; albumen, only a trace; solid constituents, 12·12 per 1000. Mr. Kruse, the analytical chemist, is responsible for the analyses. In Case 2 the results of tapping were manifest; on examination of the fluid after the tapping, the analysis was:—Sp. gravity, 1023; chlorides, 7·65 per 1000; albumen, 30·25 per 1000; solid constituents, 45·50 per 1000.

Dr. Gardner, in reply, said:—I feel that I am an advocate of a cause that seems to have very few adherents in this assemblage, therefore, possibly, I may be at a disadvantage. When we hear a physician like Dr. Bird telling us that he cures so many cases with simple tapping, it may well cause one to pause in any radical recommendations, knowing his reputation for scientific accuracy. Mr. FitzGerald, of whom no one has a higher appreciation than myself, tells us too that he has had large success in aspiration of hydatids. Well, I would venture to point out to this Congress that what we want is that men should lay on the table their statistics, the number of cases they have tapped, the results of the tapping, the accidents they have had, and the number of years that they have watched over the cases afterwards, before laying their results before us; for I venture to think that the man who undertakes to say that tapping for hydatid cysts is a panacea, has a greater amount of work and more prolonged investigations to do than the man who cuts into the lung or liver and removes the cyst. The one can say he has cured his patient, the other has to pass through years of observation before he can say he has done so, and I venture to think we have to look more to country practitioners for this detailed information. The country practitioner, with only one rival in the town or possibly none at all, knows every case of hydatid disease in the town, knows exactly when he tapped and how often he tapped it, and he can tell us the result ten years afterwards; those are the men who must come forward and settle this question, for it cannot be done by simple assertion and the record of a few isolated cases. There are many other points one would like to discuss, and certainly the subject is a very tempting one, but I must say that my previous experience of tapping and what I have read about the bad results of it, what I have seen in cases of hydatid cysts packed with daughter-cysts, which could not be removed in any way, has been confirmed. Those are the cases in which aspiration is perfectly powerless, and there I think aspiration is unlikely to be so successful as it is in an ordinary case of empyema. There is just one other point. Hydatid cyst of the lung may exist for a long time in the lung, and occasionally causes partial necrosis of the ribs. I venture to think that aspiration will be usually powerless in that condition. Even resection of the ribs and removal of the cyst will not kill the cause. What is to be done?

It is absolutely necessary in those cases, as I had to do the other day, to perform Estlander's operation—resecting a large number of ribs. If you merely resect the ribs, and expect the cavity to fill, I know by bitter experience what may result. In one case I allowed myself to leave the periosteum, and in six weeks every one of the six or eight ribs I had taken away had formed bony unions at the other end; the consequence was that the cavity I had tried to obliterate was in the same condition as before; so where there is pressure against the ribs, it is absolutely necessary to excise both the periosteum and the pleura to get a successful result.

The Chairman said:—I should be sorry to vacate this chair without expressing my indebtedness, and without offering my congratulations, to those gentlemen who have contributed their papers and their speeches to the elucidation of this question; and it will certainly be permitted to me, as a South Australian, to recognise with pleasure, that those gentlemen who read the three first papers on the treatment of hydatid, are fellow colonists and colleagues of my own. I trust, therefore, that without impropriety, I may feel it to be an especial pleasure to be in the position to offer the congratulations I do. Generally, the discussion has done what we wanted it to do. It has brought out differences of opinion between those who are best qualified to express an opinion on this peculiarly Australian subject. It is the old question of *tot homines, tot sententiæ*, and, although it might have been more satisfactory if the eminent gentlemen who have contributed to the discussion could have agreed with more absolute unanimity that such and such a course was the best one, yet the preliminary step to unanimous opinion is necessarily a fair statement of the differences existing. We have seen in this discussion the beginning of a healthy differentiation of opinion, and it is impossible not to recognise that the opinion which has been expressed by what I may now call the Adelaide school, is not generally received. I cannot myself, after what I have seen of the successful practice of Dr. Gardner, and after what I know of the large area of statistics that have been collected by Dr. Thomas, help announcing myself an adherent of the practice which they have advocated; and yet it is fair for me to ask, and fair for those gentlemen to claim, that those who object to the treatment they are advocating, shall place upon the table collections of statistics, prepared with equal care, and showing definitely certain results. We all know how fallacious impressions are, and although we cannot but concede the greatest respect to the opinions of gentlemen who have had such large experience as those who have taken a contrary view to Dr. Gardner, it is impossible not to see in their statements the one thing wanting, namely, some sort of statement, in black and white, as to what really their results have been. With these remarks, I repeat again my congratulations to all who have taken part in this very satisfactory meeting, and the result of it will go forth to the world as presenting a picture, such as it is, of what is the best practice of the best men in Australia in regard to this peculiarly Australian disease.

SECTION OF HYGIENE.

PRESIDENT'S ADDRESS.

By H. N. MacLaurin, M.D., LL.D.

President of the Board of Health of New South Wales.

COMPARATIVE VIEW OF THE MORTALITY OF THE DIFFERENT COLONIES FROM CERTAIN DISEASES.

When I was requested to undertake the honorable duty of presiding over the Section of Public Health in this Congress, I felt at first a good deal of difficulty in deciding upon the subject to which I should call your attention in this preliminary or introductory address. If I had consulted my own convenience alone, I should have probably selected the condition of public health, legislation, and administration in New South Wales, as being the matter with which I am the most familiar. But it seemed to me that, while this would naturally be of the highest importance to myself and to my fellows from the oldest colony, it could yet hardly be regarded as of sufficient interest to gentlemen from the other colonies, to justify me in making it the subject of an address which ought to be of a somewhat comprehensive and general character. I was further induced to look in another direction for my text by learning, that from at least two gentlemen of New South Wales, the members of the Section will have the privilege of hearing papers on the sanitary laws and administration of that colony, both generally and with particular reference.

After casting about in every direction, it seemed to me that I could not do better than try to lay before you a short sketch of the Health condition of the various colonies of Australasia, including New Zealand, as deduced from the registration of mortality during the last few years. This will, at all events, be an attempt to lay a foundation for the labours of the sanitarians, by showing what the diseases really are which cause death in the various communities, and consequently, what are the directions in which sanitary influences are most required. It is true that the materials at my command, being entirely drawn from mortality

tables, cannot give a complete presentation of the actual diseased conditions of the colonies, for no account is taken of those cases of disease which recover. But there are no materials in existence from which such complete information could be obtained; and I think that, on the whole, the mortality of a colony may be taken, for the present at least, to furnish a sufficiently accurate approximate estimate of the amount of disease of the colony. The plan adopted by me for this purpose, has been to select from the statistical report of the various colonies the forty most prevalent causes of death in three successive years, excepting in Western Australia, for which I was in possession of materials for only the year 1886. For the other colonies, the years selected were 1884, 1885 and 1886, excepting in the case of New South Wales, in which I had to take the years 1883, 1884 and 1885, as the complete returns for 1886 were not published in time for my inquiry.

The diseases have first of all been arranged in order of frequency, giving the total number of deaths from each registered cause. They have then been distributed, so as to show the prevalence of each cause of death during the different quinquennial periods of life; and, moreover, percentages have been calculated showing—firstly, the ratio of deaths from each cause to 100,000 of the estimated mean population published in the year to which the table refers; and secondly, the ratio which the number of deaths produced by each cause bears to the total number of deaths registered in the colony for the year. In addition, where the information was sufficient for the purpose, I have distributed the causes of death as far as possible between urban and rural districts, giving in each case similar percentages to those which were calculated for the whole colony. Owing to the insufficiency of the information at my command, this has been possible for Australia only in the cases of New South Wales and Victoria, and even in those, the method has not been altogether so satisfactory as I could wish. Thus, in New South Wales, I am able to give tables for Sydney, for its suburbs, and for the country districts generally; but I am not able to separate from the country such important centres of population as Newcastle, Goulburn, or Bathurst, which are consequently included in the country, thereby somewhat influencing the character of the mortality return. Similarly, for Victoria, I am able to distribute the return into two parts, one embracing Melbourne and its suburbs, and the other the remainder of the colony, including the country districts, as well as such large and important centres of population as Ballarat, Geelong, Sandhurst and other great towns. There can be no doubt, that by this the apparent mortality of the country districts of these colonies is somewhat increased, owing to the influence of the large country towns; but, at all events, it

is possible to ascertain the health condition of the great cities of Melbourne and Sydney, and to frame an estimate of that of the country parts sufficiently approximate to be not devoid of interest to us.

It will be readily understood, that the taking out of this information has been very laborious. For the single colony of New South Wales nearly 1000 calculations were required, all of them being of an intricate and complex character; and for the other colonies similar calculations, although not in such large numbers, had also to be made. It would have been quite impossible for me, taken up as my time is with numerous other engagements, to have carried out this very intricate piece of work by myself; and I have here to express my hearty obligations to Mr. Sager, the Secretary of the Board of Health of New South Wales, to whose ready and kindly co-operation it is due that I am able to place these tables before you.

Apart from the mechanical difficulty necessarily attached to such an enormous series of calculations, another difficulty has arisen from the fact that the nosological system adopted is not quite the same for all the colonies, and in some cases seems to have been modified in particular colonies in the course of the period under consideration. And while I am on this subject, I would also point out the great advantage that would result, from a sanitary point of view, if measures were taken in all the colonies to ensure the compulsory notification and registration of at least the more important infectious diseases. We know from our tables the mortality which results from typhoid fever, scarlet fever and measles, but we have no means at present of estimating the misery which arises from the very numerous cases of such diseases which, however, do not end in death. It is easy for medical men to conceive the grief and pain arising from these causes, as well as the absolute loss to the community, even from a pecuniary point of view; but I am afraid that the importance of this matter has not yet been brought home to the public mind. If we were able to show in an exact form the actual suffering and loss which result from the infectious diseases alone, we might hope to be able to arouse the attention of the public, and to convince them of the necessity of introducing those sanitary reforms which the profession of medicine have been so long, and for the most part ineffectually, demanding.

As in almost every other part of the world, consumption of the lungs figures in most of our returns as the greatest single cause of death. It is first in the colonies of New South Wales and Victoria for the whole period, and in South Australia for one year. In Queensland it occupies the second place; in Tasmania the third place, excepting for one year, when it is second; and in the sparsely-peopled territory of Western Australia, it is only the tenth in the order of fatality. In New Zealand

it is at the head of the list for two years of the period, and for the third it is bracketed an equal first with accidental causes. Where I have been able to separate approximately the urban and rural districts (*i.e.*, in New South Wales and Victoria), it will be found to head the list in Melbourne and suburbs, and in Sydney. In the country districts of Victoria and the suburbs of Sydney, it is found to take second place, excepting one year, when it is third; but in the rural districts of New South Wales, it holds only the third place, being exceeded by old age and accidents.

What is the relative prevalence of phthisis in the various colonies? To answer this, I have prepared the accompanying table for the year 1885, the latest common to all the colonies for which I had materials, excepting Western Australia, for which I have only materials for one year, viz. 1886. It gives the number of deaths per 100,000 living in each colony or district which I have been able to separate :—

TABLE I.—1885.

District or Colony.	Per 100,000.
New South Wales	115·71
Sydney	222·37
Suburbs	197·46
Country	75·77
Victoria	141·94
Melbourne and Suburbs	239·16
Rest of Victoria	88·62
Queensland	186·23
Tasmania	108·38
South Australia	96·01
New Zealand	89·65
Western Australia (1886)	68·21

It will be seen from this table, that the districts under consideration divide themselves into two classes, according to the prevalence of the disease. In the first, containing in order Melbourne, Sydney, suburbs of Sydney, and whole colony of Queensland, the percentage of cases is high, approaching to the average of the thickly-peopled countries of the old world. In the second division the percentage is low, the order being Tasmania, South Australia, New Zealand, Victoria outside Melbourne and suburbs, country parts of New South Wales, and lastly Western Australia, in which there were only twenty-seven deaths in all from phthisis, or at the rate of 68 per 100,000 living. In the last case, however, we should most likely consider the numbers involved too small to form an accurate standard, especially as the return is given for only one year.

Another method of regarding the prevalence of this disease is to estimate the ratio of deaths from phthisis to those from all causes. A

table containing this information for all the colonies for the same period (*i.e.* 1885, excepting Western Australia, 1886) is here given :—

TABLE II.—1885.

COLONY.	RATIO TO DEATHS FROM ALL CAUSES.
New South Wales	7·16
Sydney	11·00
Suburbs	7·80
Country	5·73
Victoria	9·63
Melbourne and Suburbs	11·87
Rest of Victoria	7·54
Queensland	9·51
Tasmania	7·12
South Australia	7·70
New Zealand	8·45
Western Australia (1886)	3·35

As in the former table, Melbourne and Sydney head the list. In Melbourne, the ratio of deaths from phthisis to those from all causes being 11·87, and in Sydney 11·00; these are followed by Queensland, 9·51 ; Victoria, as a whole, 9·63 ; New Zealand, 8·45 ; suburbs of Sydney, 7·80, and South Australia, 7·70 ; and gradually in a descending scale until we reach Western Australia, with 3.35. Here I may mention as a curious fact that, from an examination of the death returns of the Australian Mutual Provident Society for a period of thirty years, and of the Mutual Life Association of Australasia for a period of twenty years, I find the ratio which claims arising from deaths by phthisis bear to claims from all other causes whatsoever to be almost exactly the same in both societies, viz., 12·4 per cent. When we consider the very great care taken by both of these Associations in examining persons who propose to them for assurance, and when we take into account the identity of the percentage of loss to each Society from phthisis, I think we may infer that this ratio of 12·4 per cent. may be taken as the percentage of deaths from phthisis which may be expected among any number of healthy adults, principally males, distributed over the greater part of Australasia. At first sight, considering that the ratio of deaths from phthisis to deaths from all other causes for the whole colony of Victoria is only 9·63, and for the colony of New South Wales is only 7·16, it would look as if the life-insurance companies cut a very poor figure with their 12·4, in spite of all the trouble they take to exclude unhealthy lives. But this is only apparent, for we must bear in mind that the life-assurance companies rarely accept proponents under the age of fifteen, and for the most part their entrants are several years older. They thus escape the

very serious causes of death which operate for the most part in infancy and early childhood; and therefore phthisis, which is chiefly a disease of adult life, figures very highly among the death-dealing causes in the assured population. In order to make this more clear, I have taken out the ratio which deaths from phthisis bear to deaths from all causes occurring above the age of fifteen in the colonies of Victoria and New South Wales, and the results are as follows:—In Victoria, percentage of deaths from phthisis to deaths from all causes over fifteen years of age is 15·43, and in New South Wales, 13·40. Hence we see that the assurance companies' result is rather better than the average of Victoria, and a shade better than that of New South Wales; and this confirms the opinion that most intelligent men have held, that the true use of medical examination for a life-assurance company is not to provide a class of entrants much above the average in the expectancy of life, but rather by the exclusion of diseased and unhealthy lives to prevent the expectancy of the whole class of entrants in any year falling below the average. I have calculated a similar ratio for Queensland, and find it to be 16·01.

When we come to compare the condition of Australia with that of the countries of the old world, we cannot but be struck with the comparative immunity from consumption which a considerable proportion of this country enjoys. If we take the trouble to glance down the very elaborate table given by Hirsch in the third volume of his "Handbook of Geographical and Historical Pathology," we shall be pleased to find that the rural parts at least of Australia occupy a position with respect to this disease which will compare very favourably with most other countries in the globe. Even Queensland, which is much the worst of our colonies as a whole, would stand very well among European countries, being practically the same as Switzerland, in which the death-rate from phthisis is very low for Europe, and to some parts of which phthisical patients are occasionally sent by medical advice. And the more favoured colonies (at all events in the country parts) will compare favourably with the rural portions of north-west Africa, which have long been celebrated for comparative immunity from phthisis.

It is but right, however, to bear in mind, on the other hand, that the urban portions of Australia possess no such immunity, and that Melbourne and Sydney show a very considerable proportion of phthisical deaths—the former city, with its suburbs, showing 2·39 deaths per 1000 persons living, a proportion which, according to Hirsch, is nearly equal to that of many European cities, although, of course, much below many German and Austrian towns, in which phthisis seems to assume the proportions of a real plague.

It is useless to shut our eyes to the fact, that consumption has got a footing amongst us, and that it is now one of our most important causes of death. How it is to be checked in its advances, and, if possible, lessened in its prevalence, are among the most important sanitary problems of the day.

It would take too long if I were here to go into this question. I would venture, however, to draw your attention to two matters :—First, that phthisis is essentially a disease of towns, especially of great towns, and that, consequently, improvement of the hygienic conditions of great towns, more especially in ventilation, free space, and, not least, in good morals, will necessarily tend to the diminution of the phthisical death-rate ; Second, the discoveries of the last few years with respect to the bacterial origin of phthisis ought surely to awaken the public from the apathy with which they continue to consume the flesh of tuberculous oxen, and the milk of tuberculous cows. That these tuberculous animals do present the characteristic bacilli of tubercle, there is no doubt. I suppose I must admit that I cannot point to a case in which the transfer of the bacillus from the ox or cow to the human being, by feeding, has been actually demonstrated ; but the identity of the morbific cause in the ox and the human being is quite sufficiently probable to raise a suspicion strong enough to justify us in preventing any risk of the kind. There has been a good deal of trafficking in tuberculous cattle, at least in New South Wales, whether for slaughtering or dairy purposes ; and one measure which was most urgently required in that colony is a law rendering penal all trafficking in such diseased animals for any purpose whatsoever. Such a law would be of great service in preventing the spread of consumption among our population.

This view would be strengthened if we inquired how the Jews in Australia fared in regard to phthisis. It was well known that the greatest care was taken by the Jews to avoid the consumption of meat which was in any way tainted by disease. The Jews in Australia showed a great immunity from phthisis. Mr. Davis states that in the Jewish population of New South Wales, numbering 4000, he can only call to mind one death from phthisis in three years. Taking the average for the whole colony of New South Wales, the expected deaths in 4000 persons for this period would have been 13·68 ; and as Jews for the most part live in cities, we might fairly expect the death-rate to be higher than for the whole colony. Instead of the rate expected, we find, however, only one death, and a consequent saving of (say) twelve lives in this number of persons in three years. I do not say that this saving of life is entirely due to the avoiding the use of tuberculous meat, but I take leave to maintain that I am justified in crediting

this cause with a good deal of the beneficial result. Perhaps it will be still more striking if I point out the saving of life in the colony which would ensue if the Jewish average were maintained for the whole population. In 1885, 1095 persons died of consumption in New South Wales, being at the rate of 115·51 for each 100,000 of the population. If the Jewish rate had been general, only 79 would have died, being a saving of over 1000 lives in one year.

It may, of course, be alleged that this death-rate among the Jewish population ought not to be taken as being absolutely accurate, and that therefore it is hardly fair to compare it strictly with the general death-rate of the colony. Possibly this may be so, but even after making every allowance for mistaken diagnosis, and for any other probable source of error, I cannot but feel convinced that the alleged immunity of the Jews from phthisis, does, on the whole, really exist, at all events in New South Wales, and that their condition in respect to this disease contrasts very favourably with that of the general population.

As for Melbourne, I cannot give you exact figures, but I learn from Mr. Davis, on the authority of Mr. Meyer, and Dr. Brownless, the respected Chancellor of the Melbourne University, that little or no phthisis exists among the Jews in that city.

It might be worth while to notice that the country districts of New South Wales, where the phthisis rate is low, are for the most part devoted to the rearing of sheep; while Queensland, where the rate is high, is, at all events in the coast divisions, almost exclusively devoted to the raising of cattle.

Surely there is sufficient energy among us to lead us to try to reduce the general death-rate to that of the Jewish community, and the first step in this direction is in my opinion to put an absolute end to the use of meat from tuberculous oxen, and of milk from tuberculous cows.

Although consumption is nominally the most important cause of death from the numerical point of view, still we may say that in reality it must give place to certain of the diseases of infancy and childhood. To show that this is the case, it is necessary to make certain changes in the mode in which the diseases of infancy have been registered, and to classify them in groups by adding together diseases which, though nosologically separate, are yet so closely allied, as to constitute practically different varieties of one great disease. Thus, atrophy and diarrhœa of infancy, teething, want of breast-milk, and the like, may be fairly considered as varying manifestations of infantile mal-nutrition, and similar groups may be formed from the fatal nervous, and pulmonary diseases of children. If we then proceed to add together the various diseases constituting each of these principal groups, we sha

find our tables assume a somewhat different character. Herewith, I give three tables in which these diseases have been arranged in the manner indicated :—

Infantile Diseases.

Class A.—NUTRITIVE.

Total Deaths of Persons under 5 Years of Age from the undermentioned Causes in the Australasian Colonies during the year 1885.

Disease.	Name of Colony.							
	New South Wales.	Victoria.	Queensland.	Tasmania.	South Australia.	New Zealand.	Western Australia (1886).	Total.
Atrophy and Debility	1058	865	363	107	287	268	..	2948
Diarrhœa and Dysentery	781	802	431	94	268	337	..	2713
Enteritis	243	181	64	11	45	99	..	643
Teething	324	111	180	35	79	101	..	830
Tabes Mesenterica ..	269	96	58	..	49	51	..	523
Gastritis and Stomach Disease	178	219	45	..	7	43	..	492
Liver Disease	2	13	15	..	10	18	..	58
Peritonitis	18	8	2	1	6	5	..	40
Cholera	81	38	23	4	16	10	..	172
Want of Breast-milk..	79	115	28	20	29	29	..	300
Thrush	59	19	16	9	10	17	..	130
Total	3092	2467	1225	281	806	978	..	8849
Percentage to Deaths from all causes . ..	20·23	17·17	19·65	13·80	20·21	16·08	..	18·44

Class B.—NERVOUS DISEASES.

Total Deaths of Persons under 5 Years of Age from the undermentioned Causes in the Australasian Colonies during the Year 1885.

Disease.	Name of Colony.							
	New South Wales.	Victoria.	Queensland.	Tasmania.	South Australia.	New Zealand.	Western Australia (1886).	Total.
Apoplexy	..	4	..	1	3	4	..	12
Convulsions	820	312	346	141	155	153	..	1927
Cephalitis	235	179	41	16	45	42	..	558
Paralysis	5	1	2	..	1	1	..	10
Hydrocephalus ..	73	116	26	9	48	46	..	318
Brain Disease	5	21	26	15	27	38	..	132
Epilepsy	15	11	7	..	..	4	..	37
Total	1153	644	448	182	279	288	..	2994
Percentage to Deaths from all Causes ..	7·54	4·48	7·18	8·94	6·99	4·74	..	6·24

Class C.—RESPIRATORY DISEASES.

Total Deaths of Persons under 5 Years of Age from the undermentioned Causes in the Australasian Colonies during the Year 1885.

Disease.	Name of Colony.							
	New South Wales.	Victoria.	Queensland.	Tasmania.	South Australia.	New Zealand.	Western Australia (1886).	Total.
Pneumonia	236	260	31	16	84	106	..	733
Bronchitis	397	288	84	48	98	168	..	1083
Congestion of Lungs ..	69	83	41	23	10	28	..	254
Whooping Cough ..	108	162	28	16	87	87	..	488
Pleurisy	8	7	1	1	2	3	..	22
Influenza	56	29	10	3	1	5	..	104
Total	874	829	195	107	282	397	..	2684
Percentage to Deaths from all Causes ..	5·72	5·77	3·13	5·25	7·07	6·52	..	5·59

From these it will be seen that, in the case of the nutritive diseases of childhood, the warmer colonies, viz., Queensland, New South Wales, and South Australia, have a decidedly greater mortality; whereas, in the colder colonies—Victoria, New Zealand, and Tasmania—infantile mortality from nutritive disorder is less. On the other hand, from respiratory diseases Queensland shows a great immunity; but South Australia here, also, has an unfortunate pre-eminence. In nervous diseases, exemplified by convulsions, cephalitis, and so forth, Tasmania, contrary to our expectation, shows the greatest fatality, followed by New South Wales, Queensland, and South Australia. Taking it altogether, it must be observed that in all the classes of diseases of infancy, Victoria and New Zealand are decidedly the most healthy.

Old age is fourth in New South Wales, is thirteenth in Queensland, eighth in Victoria, first in Tasmania, fifth in South Australia, and in Western Australia, third. In the country parts of most of the colonies, it seems, as a cause of death, to be much on an equality with accidents.

There are many matters connected with these tables which it would be exceedingly interesting to inquire into; but in a brief sketch like the present, detailed inquiry necessarily would be somewhat out of place, my object being to give a few of the most salient points, which are obvious on a cursory glance. I must, moreover, remember that the time at our disposal is but limited, and that there are also limits to your patience, on which I must not encroach too much. I shall, therefore, refrain from going regularly down the columns, and shall now confine

myself to considering one or two of the most important diseases, especially those which are generally considered the most amenable to sanitary influences. Of these, typhoid fever is certainly one of the principal, whether we consider its prevalence, the amount of public attention it excites, or the influence which sanitary improvements are believed to have in checking it. The exact details of the prevalence of this disease, during the three years under consideration, will be found set forth at length in the larger tables which I have caused to be prepared. For convenience I have, as in the case of phthisis, selected the latest year for which a return common to all the colonies is in my possession, viz., 1885; and I have drawn up a short table, giving at a glance a comparative view of the mortality from typhoid fever in the various colonies during that year. And it is to be borne in mind that this is only an account of the mortality from typhoid, and that the real sickness from typhoid—that is to say, the number of persons affected by this disease who recovered from it, or at all events who did not die from it—cannot in any way be ascertained, there being no materials for the purpose, but must be simply estimated as a matter of speculation by each of us, in accordance with his experience of the fatality attendant upon the disease in different places.

Typhoid Fever, 1885.

Name of Colony or District.	Order of Fatality.	Total Deaths.	Rate per 100,000 of Population.	Percentage of Deaths.
New South Wales	12th	503	53·06	3·29
Sydney	9th	93	71·31	3·53
Suburbs	9th	130	85·28	3·37
Country	11th	280	42·10	3·18
Victoria	10th	424	43·48	2·95
Melbourne and Suburbs	12th	183	52·98	2·63
Country	9th	241	38·27	3·25
Queensland	3rd	541	169·90	8·68
South Australia	11th	145	45·34	3·64
New Zealand	16th	128	22·32	2·10
Tasmania	18th	30	22·42	1·47
Western Australia (1886)..	16th	13	32·84	1·61

From this table it will be seen that Queensland is by far the greatest sufferer from this disease of any of the colonies. In that tropical province, typhoid occupies the second place in the list of fatality, causing 541 deaths in the year, an absolutely greater number than in any other colony; the relative mortality was at the rate of 169·9 per 100,000 of the population, and the percentage to deaths from all causes was 8·68. Taking the other years in my tables, it appears that in 1884 the results were rather worse, and in 1886 rather better; we may, therefore, assume that the results of 1885 give not an unfair idea of the

mortality from typhoid fever in Queensland. It is certainly very high, quite sufficiently so, I think, to attract the attention of sanitary inquirers in that Colony. Leaving Queensland, which occupies an unenviable position by itself, we shall find that the death-rate in even the most populous of the other colonies is much lighter, although there can be no doubt that in some there is still a good deal of room for improvement. New South Wales is the worst, with its death-rate for the whole colony of 53·06, which rises in Sydney to 71·31, and in the suburbs to 85·28. These figures, especially the last, are far from creditable; but I am glad to say that public attention has at last been called to this matter, and various measures have been adopted, or are in process of adoption, with a view to reducing the mortality from this disease. Of these, I may mention the Dairies Supervision Act, which was passed in 1886, and is now gradually being extended to different parts of the colony. I should also notice that the Government have in preparation a comprehensive scheme of sewerage for the western suburbs of Sydney, which have hitherto been left to their own devices in this important matter.

The somewhat sensational reports which from time to time appeared in the newspapers last summer as to the prevalence of typhoid fever in Victoria, would lead us to suppose that there had been at that time a considerable increase, within a comparatively recent period, in the prevalence of this disease in that colony. I am, of course, not in a position to give the number of deaths for 1888, but for 1887 there were 631, whereas in 1885 there were only 424, being at the rate of 43·48 per 100,000; Melbourne and suburbs being credited with 183 of these deaths, at the rate of 52·98 per 100,000 of the population.

It would appear from these figures, that of late typhoid fever has been increasing in severity in Victoria. What may be the reason of this, I shall leave to those to say whose business it is to manage the health affairs of the colony.

South Australia appears to be, as regards this disease, much on a level with Victoria and New South Wales, the mortality being 45·34 per 100,000. But when we come to consider the island colonies, we find a very different, and much more agreeable, state of matters, the death-rate falling in New Zealand to 22·32, and in Tasmania to 22·42, per 100,000. Here, then, is a problem for the sanitarians, which I trust they will lose no time in attacking, viz.:—How to reduce the 169·9 of Queensland—not to speak of the smaller figures of the other Australian colonies—to the very desirable 22·32 of New Zealand.

The last disease with a notice of which I shall trouble you to-day, is one which has always attracted great attention in the different parts of Australia, viz., diphtheria. In accordance, as I believe, with the views of the best authorities, I have associated croup with it. I attach hereto

a table, giving a comparative view of the prevalence of the disease in the different colonies for the year 1885, already selected, excepting, as usual, Western Australia, for which I have only one return, viz., 1886 :—

Name of Colony or District.	Order of Fatality.	Total Deaths.	Rate per 100,000 of Population.	Percentage of Deaths.
New South Wales	10th	582	61·38	3·76
Sydney	..	46	35·27	1·74
Suburbs	..	91	59·70	2·35
Country	..	445	66·90	5·06
Victoria	14th	332	34·05	2·31
Melbourne and Suburbs	..	129	37·35	1·85
Country	..	203	32·24	2·74
Queensland	9th	208	65·32	3·34
South Australia	7th	188	58·79	4·71
New Zealand	10th	172	29·99	2·83
Tasmania	13th	50	37·37	2·45
Western Australia	23rd	9	22·74	1·12

From this it appears that, if whole colonies be taken, Queensland has again a bad pre-eminence, heading the list with a death-rate of 65·32 per 100,000, to which New South Wales comes, as a very close second, with 61·38. If we leave out from the latter the figures for Sydney and suburbs, we find that the country districts of New South Wales surpass the whole colony of Queensland, the death-rate amounting to 66·90 per 100,000. This is another illustration of the well-known principle, that diphtheria is a disease rather of the country than the town. An apparent exception to this is shown by the suburbs of Sydney, which, with the high ratio of 59·70, approach closely to the rural rate. This excessive prevalence of diphtheria appears to me to be, to a considerable extent, due to the absence of any systematic method of getting rid of the fæcal accumulations within these suburbs, a defect which, I am glad to say, is likely very soon to be remedied. South Australia, with its ratio of 58·79, follows close on New South Wales; and the three colonies named are in a distinctly worse position as regards mortality from diphtheria than any of the other colonies. Thus in Victoria, the rate was only 34·05; in Tasmania, it was 37·37; in New Zealand, it was just under 30; while in Western Australia, it was a little over 22 per 100,000.

The difference in these figures is sufficiently striking, and here again plenty of scope is offered for the exertions of sanitarians.

There are very many other matters of interest connected with these tables to which I might draw your attention; for example, the prevalence of different diseases in different quinquennial periods of life would afford us a most interesting subject of study. But time will not

allow me to enter into the subject with further detail; and in fact, as you will see, I have not been able to do more than deal with it in the most superficial way, touching merely on the matters which were most obvious on the surface. But even such cursory consideration as we have been able to give to-day, is quite sufficient to show that there is an ample field in these colonies for the exercise of all means for the improvement of the public health.

In conclusion, I venture to express the hope that our sanitarians will leave no stone unturned until they succeed in lowering the death-rates from preventable diseases in all the colonies—at all events to the minimum level which our tables show to exist in the most salubrious of our districts.

And I am sure that I cannot give utterance to this aspiration more appropriately than before the present audience, composed as it is of the most distinguished practitioners of medicine from all the Australasian colonies, and more especially of those who take particular interest in matters of public health. This great Congress of the profession, so successfully organised by our Victorian friends, ought to lead to the most beneficial results in every branch of medicine, and certainly not least are the hopes entertained from our action in the department of public health. Medical men have always been honourably distinguished by the great interest they take in sanitary matters, and it is to us that the public naturally look for guidance and advice in such questions. It is our duty to make plain to everyone what are the shortcomings of our community in questions of public health, and to show how these shortcomings can be remedied. No better opportunity can be conceived than this Congress affords for the proclaiming of our views, and it is difficult to over-estimate the influence for good which it will have with the public, who are never backward in acknowledging with respect any honest effort to advance the interest of the community.

each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.
1	Phthisis	50	15	14	59	117	150	122	109	107	68	46	38	20	12	8	2	11
2	Old Age	..	..	..	..	..	..	..	..	.	..	..	2	110	77	186	483	10
3	Atrophy and Debility	832	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Diarrhœa and Dysentery	624	7	2	4	2	2	2	8	8	16	14	14	11	22	17	16	1
5	Accidents	137	62	42	39	71	71	54	42	37	52	46	22	24	18	11	17	18
6	Convulsions	687	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	1
7	Dis. of Circulatory Syst.	26	12	14	17	27	23	32	53	65	49	47	61	78	63	39	32	2
8	Bronchitis	364	24	1	4	5	2	3	10	7	13	14	17	47	36	28	43	2
9	Pneumonia	210	20	9	19	35	40	37	47	38	36	30	17	15	20	49	14	11
10	Diphtheria and Croup	329	98	23	5	..	2	2	..	2	..	..	1	1	..	1	..	..
11	Typhoid Fever	52	29	34	57	56	45	35	15	17	9	21	8	3	7	..	4	5
12	Premature Birth ..	315	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	Enteritis	179	6	6	19	15	12	8	5	4	7	3	5	8	5	8	2	1
14	Teething	247	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	Apoplexy	25	2	..	3	5	9	4	15	20	20	16	24	32	19	17	18	6
16	Cancer	3	2	1	..	..	3	..	12	14	26	36	24	35	27	17	14	1
17	Cephalitis	154	14	12	4	6	5	2	3	1	2	2	3	1	2	1	..	1
18	Gastritis, Stomach Dis.	137	4	2	1	4	2	3	3	6	4	12	2	5	5	2	4	1
19	Tabes Mesenterica ..	189	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	Brain Disease	24	7	8	5	10	10	11	10	12	10	16	13	8	13	11	7	1
21	Dropsy	14	3	4	1	5	2	7	7	9	13	10	14	21	13	8	10	2
22	Liver Disease	2	1	1	2	2	3	7	12	22	17	15	16	12	11	7	2	..
23	Congestion of Lungs ..	69	2	2	1	2	6	4	5	3	2	4	3	2	4	3	6	3
24	Childbirth and Metria	..	..	..	2	20	26	18	22	18	2	..	..	..	..	..	..	6
25	Nephria	2	1	1	2	5	10	4	16	12	7	8	10	6	10	3	4	..
26	Alcoholism	..	..	..	..	1	5	10	18	10	9	16	8	7	2	1	3	4
27	Epilepsy	6	9	3	8	9	9	4	8	10	8	5	2	3	4	2	2	..
28	Peritonitis	14	4	5	6	4	12	9	5	5	5	3	2	5	3	2	2	1
29	Cholera	65	1	..	1	..	1	..	1	3	1	2	1	1	1	1	1	..
30	Rheumatism	1	5	7	2	5	6	5	6	4	7	4	4	1	1	..	..	1
31	Asthma	7	..	2	2	1	3	3	3	6	6	4	4	6	3	8	..	..
32	Hepatitis	5	..	..	..	2	5	2	4	5	6	10	5	2	3	3	2	..
33	Suicides	..	..	..	..	5	6	7	10	6	3	5	3	3	1	..	4	1
34	Whooping Cough ..	52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	Pleurisy	2	1	1	4	3	9	3	5	3	5	2	1	4	3	3	..	2
36	Hydrocephalus ..	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	Want of Breast Milk ..	48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	Measles	39	4	2	..	..	..	1	1	..	..	..	..	..	..	..	..	..
39	Scarlatina	35	9	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..
40	Thrush	37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	5031	312	197	267	419	479	399	455	454	403	391	325	471	385	406	692	92

Order of Fatality.	Cause of Death.	Whole Colony.			Sydney.			Suburbs.			Country.		
		Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.
1	Phthisis	948	112·77	7·74	229	198·02	10·25	257	190·14	9·46	462	78·33	6·33
2	Old Age	868	103·26	7·09	77	66·58	3·45	94	69·54	3·46	697	118·17	9·55
3	Atrophy and Debility	832	98·97	6·79	161	139·22	7·21	312	230·83	11·49	359	60·87	4·92
4	Diarrhœa and Dysentery	770	91·60	6·29	125	108·09	5·60	256	189·40	9·43	390	66·12	5·34
5	Accidents	763	90·77	6·23	87	75·23	3·90	90	66·58	3·31	586	99·35	8·03
6	Convulsions	690	82·08	5·63	134	115·87	6·00	134	99·14	4·93	422	71·55	5·78
7	Dis. of Circulatory Syst.	640	76·13	5·22	144	124·52	6·45	126	93·22	4·64	370	62·73	5·07
8	Bronchitis	620	73·75	5·06	112	96·85	5·01	129	95·44	4·75	379	64·26	5·19
9	Pneumonia	617	73·40	5·04	86	74·37	3·85	107	79·16	3·94	424	71·89	5·81
10	Diphtheria and Croup	464	55·19	3·80	47	40·64	2·10	83	61·40	3·06	334	56·63	4·57
11	Typhoid Fever	397	47·23	3·24	77	66·58	3·45	93	68·80	3·42	227	38·49	3·11
12	Premature Birth ..	315	37·47	2·57	55	47·56	2·46	78	57·71	2·91	182	30·86	2·49
13	Enteritis	293	34·85	2·39	55	47·56	2·46	87	64·36	3·20	151	25·60	2·07
14	Teething	247	29·38	2·02	29	25·08	1·30	44	32·55	1·62	174	29·50	2·38
15	Apoplexy	235	27·95	1·92	52	44·97	2·33	68	50·31	2·50	115	19·50	1·57
16	Cancer	215	25·58	1·75	49	42·37	2·19	39	28.85	1·44	127	21·53	1·74
17	Cephalitis	213	25·34	1·74	41	35·45	1·84	66	48·83	2·43	106	17·97	1·45
18	Gastritis, Stomach Dis.	197	23·43	1·61	38	32·86	1·70	54	39·95	1·99	105	17·80	1·44
19	Tabes Mesenterica ..	189	22·48	1·54	49	42·37	2·19	56	41·43	2·06	84	14·24	1·15
20	Brain Disease	176	20·94	1·44	38	32·86	1·70	27	19·97	·99	111	18·82	1·52
21	Dropsy	143	17·01	1·17	27	23·35	1·21	23	17·02	·85	93	15·77	1·27
22	Liver Disease	132	15·70	1·08	30	25·94	1·34	31	22·93	1·14	71	12·04	·97
23	Congestion of Lungs ..	121	14·39	·99	24	20·75	1·07	34	25·15	1·25	64	10·85	·88
24	Childbirth and Metria	114	13·56	·93	9	7·78	·40	10	7·40	·37	95	16·11	1·30
25	Nephria	101	12·01	·82	35	30·26	1·57	21	15·54	·77	45	7·63	·62
26	Alcoholism	94	11·18	·77	35	30·26	1·57	14	10.36	·51	45	7·63	·62
27	Epilepsy	92	10·94	·75	13	11·24	·58	28	20·71	1·03	51	8·65	·70
28	Peritonitis	87	10·35	·71	20	17·29	·89	24	17·75	·88	43	7·29	·59
29	Cholera	80	9·52	·65	19	16·43	·85	20	14·80	·74	40	6·78	·55
30	Rheumatism	59	7·02	·48	8	6·92	·36	20	14·80	·74	31	5·25	·42
31	Asthma	58	6·90	·47	4	3·46	·18	12	8·88	·44	42	7·12	·57
32	Hepatitis	54	6·42	·44	10	8·65	·45	12	8·88	·44	32	5·42	·44
33	Suicides	54	6·42	·44	16	13·83	·72	9	6·66	·33	29	4·92	·40
34	Whooping Cough ..	52	6·18	·42	3	2·59	·13	5	3·70	·18	44	7·46	·60
35	Pleurisy	51	6·07	·41	2	1·73	·09	7	5·18	·26	42	7·12	·57
36	Hydrocephalus ..	49	5·83	·40	14	12·11	·63	10	7·40	·37	25	4·24	·34
37	Want of Breast Milk ..	48	5·71	·39	20	17·29	·89	12	8·88	·44	16	2·71	·22
38	Measles	47	5·59	·38	10	8·65	·45	13	9·62	·48	24	4·07	·33
39	Scarlatina	46	5·47	·37	2	1·73	·09	8	5·92	·29	36	6·10	·49
40	Thrush	37	4·40	·30	8	6·92	·36	5	3·70	·18	24	4·07	·33
	Total	11208	1333·31	91·50	1994	1724·29	89·30	2518	1862·89	92·74	6697	1135·46	91·73

Return of Deaths from the Forty most Prevalent Causes in the Colony of New South Wales during the year 1884. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.	Sydney. Total Deaths.	Sydney. Rate per 100,000.	Sydney. Percentage to Deaths from all Causes.	Suburbs. Total Deaths.	Suburbs. Rate per 100,000.	Suburbs. Percentage to Deaths from all Causes.	Country. Total Deaths.	Country. Rate per 100,000.	Country. Percentage to Deaths from all Causes.
1	Phthisis	60	15	15	62	156	140	123	106	103	78	65	37	26	17	5	4	6	1018	113·67	7·16	236	191·56	9·31	293	203·48	8·64	481	76·56	5·80
2	Atrophy and Debility	975	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	975	108·87	6·86	194	157·47	7·65	345	239·59	10·17	436	69·39	5·26
3	Diarrhœa and Dysentery	736	15	3	..	6	5	7	9	12	10	21	7	21	23	23	13	2	913	101·95	6·42	156	126·63	6·15	307	213·20	9 05	450	71·62	5·42
4	Old Age	..	..	..	..	..	..	..	..	..	..	..	2	81	94	203	491	5	876	97·82	6·16	105	85·23	4·14	120	83·33	3·54	651	103·61	7·85
5	Accidents	145	64	44	49	84	70	51	53	63	54	48	34	33	25	14	11	30	872	97·37	6·13	108	87·66	4·26	100	69·44	2·95	664	105·67	8·00
6	Convulsions	810	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	815	91·01	5·73	155	125·81	6·11	180	125·00	5·31	480	76.39	5·79
7	Bronchitis	468	18	7	5	4	10	8	14	15	19	17	24	29	30	41	38	1	748	83·52	5·26	141	114·45	5·56	176	122·22	5·19	431	68·59	5·20
8	Dis. of Circulatory Syst.	33	25	14	14	27	40	26	46	50	58	76	49	62	53	62	41	8	684	76·38	4·81	115	93·35	4·54	159	110·42	4·69	410	65·25	4·94
9	Pneumonia	209	27	15	26	32	36	33	27	38	35	39	23	27	20	17	16	7	627	70·01	4·41	95	77·11	3·75	132	91·67	3·89	400	63·66	4·82
10	Enteritis	282	23	18	23	41	26	16	20	17	9	13	9	9	16	3	2	1	528	58·96	3·71	70	56·82	2·76	193	134·03	5·69	265	42·17	3·19
11	Typhoid Fever	93	25	49	70	87	65	33	25	17	14	11	11	4	6	3	..	3	516	57·62	3·63	100	81·17	3·94	109	75·70	3·21	307	48·86	3·70
12	Diphtheria and Croup	222	76	14	3	2	2	..	..	2	..	2	..	2	..		..	..	325	36·29	2·28	34	27·60	1·34	58	40·28	1·71	233	37·28	2·81
13	Premature Birth ..	307	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	307	34·28	2·16	56	45·45	2·21	66	45·83	1·95	185	29·44	2·23
14	Teething	277	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	277	30·93	1·95	18	14·61	·71	64	44·44	1·89	195	31·03	2·35
15	Cephalitis	187	27	7	4	8	7	3	4	3	2	4	..	..	..	..	3	1	260	29·03	1·83	59	47·89	2·33	92	63·89	2·71	109	17·35	1·31
16	Cancer	1	1	..	..	4	2	6	16	23	32	28	33	22	30	20	15	..	233	26·02	1·64	41	33·28	1·62	52	36·11	1·53	140	22·28	1·69
17	Apoplexy	1	1	1	2	2	9	7	15	17	23	30	24	26	34	15	20	3	230	25·68	1·62	53	43·02	2·09	50	34·72	1·47	127	20·21	1·53
18	Scarlatina	151	51	14	6	1	3	..	..	1	..	..	..	..	..	1	..	1	229	25·57	1·61	21	17·04	·83	38	26·39	1·12	169	26·89	2·04
19	Tabes Mesenterica ..	214	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	216	24·12	1·52	55	44·64	2·17	63	43·75	1·86	106	16·87	1·28
20	Whooping Cough ..	186	12	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	201	22·44	1·41	33	26·79	1·30	78	54·17	2·30	90	14·32	1·08
21	Paralysis	2	..	..	2	1	4	7	5	12	17	24	21	26	20	26	27	3	197	21·99	1·38	25	20·29	·99	33	22·92	·97	139	22·12	1·67
22	Liver Disease	12	1	2	1	2	8	9	12	17	25	26	18	19	10	12	2	1	177	19·76	1·24	31	25·16	1·22	52	36·11	1·53	94	14·96	1·13
23	Dropsy	17	6	7	1	8	5	9	8	17	10	15	15	16	19	5	15	2	175	19·54	1·23	41	33·28	1·62	32	22·22	·94	102	16·23	1·23
24	Gastritis, Stomach Dis.	108	6	1	2	4	1	1	7	4	8	4	2	3	9	1	2	..	163	18·29	1·15	26	21·10	1·02	57	39·58	1·68	80	12·73	·96
25	Congestion of Lungs ..	85	6	4	1	8	5	5	1	2	5	8	10	4	7	2	3	1	157	17·53	1·10	31	25·16	1·22	40	27·78	1·18	86	13·69	1·04
26	Brain Disease	20	5	1	9	8	4	6	11	18	13	12	10	13	9	5	3	1	148	16·53	1·04	32	25·97	1·26	31	21·53	.91	85	13·53	1·02
27	Childbirth and Metria	..	..	..	9	26	30	29	28	12	1	..	..	..	..	..	..	2	137	15·30	·96	14	11·36	·55	24	16·67	·71	99	15·75	1·19
28	Epilepsy	11	10	12	8	14	15	14	15	8	2	5	5	3	6	2	3	2	135	15·07	·95	24	19·48	·95	28	19·44	·82	83	13·21	1·00
29	Peritonitis	18	2	3	6	15	19	14	7	10	4	4	3	6	2	..	2	..	115	12·84	·81	14	11·36	·55	31	21·53	·91	70	11·14	·84
30	Nephria	5	..	3	2	8	4	18	7	9	10	10	14	14	5	1	2	..	112	12·51	·79	33	26·79	1·30	29	20·14	·85	49	7·80	·59
31	Alcoholism	..	..	..	..	5	6	16	10	15	14	10	8	3	4	1	..	3	95	10·61	·67	34	27·60	1·34	10	6·94	·29	51	8·12	·61
32	Suicides	..	..	..	7	7	8	11	9	5	5	10	6	3	..	3	..	7	81	9·04	·57	18	14.61	·71	8	5·55	·23	55	8·75	·66
33	Pleurisy	2	4	2	8	9	3	3	6	8	10	6	4	3	4	1	..	..	73	8·15	·51	7	5·68	·28	16	11·11	·47	48	7·64	.58
34	Cholera	59	1	..	..	1	..	..	..	3	..	3	1	1	..	2	1	..	72	8·04	·51	14	11·36	·55	12	8·33	·35	46	7·32	·55
35	Want of Breast Milk ..	71	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	71	7·93	·50	9	7·30	·35	22	15·28	·65	40	6·36	·48
36	Other Malformations ..	69	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	69	7·70	·48	9	7·30	·35	29	20·14	·85	31	4·93	·37
37	Hepatatis	5	1	1	..	..	2	4	7	5	3	10	6	5	4	10	1	..	64	7·15	·45	11	8·93	·43	17	11·80	·50	36	5·74	·43
38	Kidney Disease, &c. ..	3	1	..	..	2	4	3	5	2	8	8	8	4	6	4	6	..	64	7·15	·45	20	16·23	·79	11	7·64	·32	33	5·25	·40
39	Hydrocephalus ..	62	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	64	7·15	·45	18	14·61	·71	12	8·33	·35	34	5·41	·41
40	Asthma	5	..	..	1	1	..	3	4	6	2	9	6	6	3	7	2	1	56	6·25	·39	18	14·61	·71	11	7·64	·32	27	4·30	·32

showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony.			Sydney.			Suburbs.			Country.		
																			Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.
1	Phthisis	55	12	13	53	147	198	141	107	119	93	69	39	18	13	5	6	7	1095	115·51	7·16	290	222·37	11·00	301	197·46	7·80	504	75·77	5·73
2	Atrophy and Debility ..	1058	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1059	111·71	6·93	190	145·69	7·21	399	261·76	10·34	470	70·66	5·35
3	Accidents	162	63	51	59	65	78	72	70	61	65	64	23	36	36	19	18	15	957	100·95	6·26	156	119·61	5·92	125	82·00	3·24	677	101·63	7·69
4	Old Age	..	..	..	..	..	..	..	..	..	..	..	4	101	82	168	583	1	939	99·05	6·14	91	69·77	3·45	127	83·31	3·29	721	108·40	8·20
5	Diarrhœa & Dysentery	781	4	3	3	7	5	2	7	12	6	20	14	13	14	20	26	1	938	98·95	6·13	190	145·69	7·21	339	222·39	8·79	409	61·49	4·65
6	Convulsions	820	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	822	86·71	5·38	126	96·61	4·78	212	139·07	5·50	484	72·77	5·51
7	Pneumonia	236	30	15	32	64	56	46	48	47	38	31	42	15	23	28	25	6	782	82·49	5·12	133	101·98	5·04	152	99·72	3·94	502	75·47	5·71
8	Dis. of Circulatory Syst.	28	23	21	26	27	34	36	59	52	73	72	57	55	88	44	51	6	752	79·33	4·92	118	90·48	4·48	178	116·77	4·61	456	68·56	5·19
9	Bronchitis	397	16	5	2	..	4	12	6	10	11	28	32	34	49	44	50	1	701	73·95	4·59	125	95·85	4·74	141	92·50	3·65	435	65·40	4·95
10	Diphtheria and Croup	415	131	23	7	2	1	..	1	1	1	..	..	..	..	..	..	..	582	61·38	3·76	46	35·27	1·74	91	59·70	2·35	445	66·90	5·06
11	Enteritis	243	21	19	21	51	42	29	14	8	18	5	8	7	10	7	4	1	508	53·59	3·32	46	35·27	1·74	200	131·21	5·18	262	39·39	2·98
12	Typhoid Fever	49	38	39	73	83	72	41	36	25	13	6	10	6	8	2	1	1	503	53·06	3·29	93	71·31	3·53	130	85·28	3·37	280	42·10	3·18
13	Cephalitis	235	32	15	7	7	7	7	8	3	2	5	6	2	..	2	1	1	340	35·86	2·22	63	48·31	2·39	106	69·54	2·75	171	25·71	1·94
14	Teething	324	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	324	34·18	2·12	43	32·97	1·63	94	61·67	2·44	187	28·11	2·13
15	Premature Birth ..	321	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	321	33·86	2·10	67	51·37	2·54	96	62·98	2·49	158	23·75	1·80
16	Tabes Mesenterica ..	269	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	271	28·59	1·77	41	31·43	1·55	89	58·39	2·31	141	21·20	1·60
17	Cancer	4	..	..	..	..	6	11	10	20	39	32	39	25	24	27	26	4	267	28·15	1·75	51	39·11	1·93	49	32·14	1·27	167	25·11	1·90
18	Apoplexy	..	..	1	3	5	7	10	19	23	24	29	35	27	26	25	26	..	260	27·43	1·70	82	62·88	3·11	61	40·02	1·58	117	17·59	1·33
19	Gastritis, Stomach Dis.	178	1	2	1	4	1	2	3	6	3	3	9	4	8	4	3	2	234	24·68	1·53	56	42·94	2·12	99	64·95	2·57	80	12·03	·91
20	Paralysis	5	2	1	4	4	5	5	14	10	20	27	23	20	30	21	34	..	225	23·73	1·47	34	26·07	1·29	42	27·55	1·09	149	22·40	1·69
21	Dropsy	24	6	6	2	6	4	14	6	9	8	16	12	12	17	16	18	..	176	18·57	1·15	28	21·47	1·06	30	19·68	·78	118	17·74	1·34
22	Liver Disease ..	2	1	..	2	2	11	9	10	17	20	23	23	14	20	11	7	..	172	18·15	1·12	28	21·47	1·06	49	32·14	1·27	96	14·43	1·09
23	Congestion of Lungs	69	11	2	2	2	7	6	7	7	3	8	8	10	9	6	4	..	161	16·98	1·05	18	13·80	·68	42	27·55	1·09	96	14·43	1·09
24	Epilepsy	15	16	8	9	11	13	11	8	11	5	4	6	9	4	2	2	1	135	14·24	·88	19	14·57	·72	35	22·96	·91	81	12·18	·92
25	Peritonitis	18	7	10	9	23	19	12	6	8	9	3	2	1	2	1	2	..	132	13·92	·86	33	25·30	1·25	31	20·34	·80	68	10·22	·77
26	Brain Disease ..	5	4	1	1	5	5	6	11	10	20	13	9	9	17	8	7	..	131	13·82	·86	25	29·17	·95	22	14·43	·57	84	12·63	·95
27	Scarlatina	96	17	6	3	1	2	2	..	..	..	..	..	..	..	..	..	..	127	13·40	·83	20	15·33	·76	42	27·55	1·09	65	9·77	·74
28	Childbirth and Metria	..	..	..	9	26	30	26	20	14	2	..	..	..	..	..	..	..	127	13·40	·83	17	13·03	·64	20	13·12	·52	90	13·53	1·02
29	Whooping Cough ..	108	4	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	114	12·02	·74	4	3·06	·15	20	13·12	·52	90	13·53	1·02
30	Nephria	4	2	2	3	6	12	5	12	9	12	13	10	7	5	9	3	..	114	12·02	·74	22	16·87	·83	42	27·55	1·09	50	7·52	·57
31	Cholera	81	5	1	..	2	1	2	1	3	1	2	1	2	2	1	1	..	106	11·18	·69	19	14·56	·72	46	30·18	1·19	41	6·16	·47
32	Pleurisy	8	2	..	5	8	11	10	10	13	7	4	5	6	2	3	3	..	97	10·22	·63	10	7·67	·38	30	19·68	·78	57	8·57	·65
33	Suicides	..	..	..	2	9	12	12	4	14	12	10	6	5	5	..	2	2	95	10·02	·62	21	16·10	·80	13	8·53	·34	61	9·17	·69
34	Influenza	56	3	1	..	2	1	1	1	..	2	4	2	5	3	6	6	1	94	9·92	·61	..	..	..	20	13·12	·52	74	11·12	·84
35	Alcoholism	..	..	..	..	2	7	12	9	17	14	11	8	7	4	1	1	..	93	9·81	·61	32	24·53	1·21	17	11·15	·44	45	6·76	·51
36	Want of Breast-milk ..	79	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	79	8·33	·52	..	..	..	30	19·68	·78	49	7·37	·56
37	Kidney Disease, &c. ..	12	2	1	1	1	2	5	6	2	3	8	5	7	7	6	9	..	77	8·12	·50	12	9·20	·45	22	14·43	·57	43	6·46	·49
38	Hydrocephalus ..	73	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	75	7·91	·49	9	6·90	·34	27	17·71	·70	39	5·86	·44
39	Hepatitis	5	1	..	2	1	2	1	8	5	6	12	10	7	5	1	2	1	69	7·28	·45	12	9·20	·45	20	13·12	·52	37	5·56	·42
40	Rheumatism	1	6	6	3	2	5	1	8	3	5	4	4	5	5	2	3	..	63	6·64	·41	17	13·03	·64	8	5·25	·21	38	5·71	·43
	Total	6236	467	252	346	575	660	549	529	539	535	526	452	469	518	489	924	51	14117	1489·16	92·38	2377	1422·67	90·17	3597	2359·74	93·26	8137	1223·35	92·58

Return of Deaths from the Forty most Prevalent Causes in the Colony of Victoria during the year 1884. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony.			Melbourne & Suburbs.			Country.		
																			Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.	Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.
1	Phthisis	25	12	24	104	206	201	139	123	124	117	107	82	53	28	8	6	..	1359	143·64	10·06	789	244·51	11·90	570	91·43	8·29
2	Dis. of Circulatory Syst.	15	10	16	25	33	28	25	28	44	87	108	108	111	104	90	69	..	901	95·23	6·67	323	100·09	4·87	578	92·71	8·40
3	Atrophy and Debility	759	2	4	1	3	1	1	5	4	13	8	10	42	..	..	..	..	853	90·16	6·32	482	149·37	7·27	371	59·51	5·39
4	Pneumonia	273	23	14	19	36	19	14	33	32	38	49	60	48	41	32	28	..	759	80·22	5·62	338	104·74	5·10	421	67·53	6·12
5	Diarrhœa & Dysentery	596	5	1	1	..	5	3	3	3	7	12	12	20	8	18	27	..	721	76·21	5·34	384	118·99	5·79	337	54·06	4·90
6	Accidents	140	61	39	42	54	42	28	24	27	48	64	38	27	18	14	17	2	685	72·40	5·07	218	67·56	3·29	467	74·91	6·79
7	Bronchitis	349	14	3	2	5	4	4	3	10	21	21	40	37	38	40	63	..	654	69·12	4·84	303	93·90	4·57	351	56·30	5·10
8	Old Age	..	..	..	..	..	..	..	..	..	..	..	..	..	55	103	310	..	468	49·47	3·46	150	46·48	2·26	318	61·11	4·62
9	Typhoid Fever, &c. ..	59	49	45	85	79	50	18	14	12	8	11	6	9	5	..	6	..	456	48·20	3·38	220	68·18	3·32	236	37·86	3·43
10	Cancer	3	3	1	..	4	9	7	25	29	63	79	72	53	43	27	28	..	446	47·14	3·30	180	55·78	2·71	266	42·67	3·87
11	Apoplexy	2	1	2	4	9	5	10	16	26	36	49	37	46	49	37	37	..	366	38·68	2·71	189	58·57	2·85	177	28·39	2·57
12	Croup and Diphtheria	210	112	6	7	..	2	1	2	1	1	..	..	..	..	1	..	..	343	36·25	2·53	99	30·68	1·49	244	39·13	3·55
13	Brain Disease, &c. ..	22	6	12	15	15	15	15	15	26	31	33	32	32	25	15	20	..	329	34·77	2·44	219	67·87	3·30	110	17·64	1·60
14	Liver Disease, &c. ..	18	1	2	1	1	12	17	22	26	42	45	46	41	22	18	12	..	326	34·46	2·41	181	56·09	2·73	145	23·26	2·11
15	Premature Birth ..	174	146	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	320	33·82	2·37	150	46·48	2·26	170	27·27	2·47
16	Convulsions	278	2	..	..	..	1	..	1	..	1	..	1	..	..	..	1	1	286	30·23	2·12	178	56·16	2·68	108	17·32	1·57
17	Gastritis, Stomach Dis.	184	6	3	1	4	8	4	3	3	8	8	7	8	11	2	10	..	270	28·54	1·99	156	48·34	2·35	114	18·28	1·66
18	Cephalitis	175	20	10	9	7	7	4	3	4	4	6	6	2	4	..	1	..	262	27·69	1·94	151	46·79	2·28	111	17·80	1·61
19	Measles	196	26	4	..	1	4	2	..	..	..	..	..	..	..	..	..	..	233	24·63	1·72	176	54·54	2·65	57	9·14	·83
20	Congestion of Lungs ..	113	6	4	4	1	1	7	5	5	13	13	2	14	7	10	10	..	215	22·72	1·59	107	33·16	1·61	108	17·32	1·57
21	Enteritis	128	4	5	3	6	1	1	7	5	3	7	11	9	13	7	3	..	213	22·51	1·58	102	31·61	1·54	111	17·80	1·61
22	Whooping Cough ..	208	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	209	22·09	1·55	161	49·89	2·43	48	7·70	·70
23	Childbirth and Metria	..	..	1	16	49	41	30	42	22	2	..	..	..	..	..	..	..	203	21·46	1·50	93	28·82	1·40	110	17·64	1·06
24	Paralysis	4	1	1	3	2	4	1	6	14	11	16	16	25	39	27	28	..	198	20·93	1·47	93	28·82	1·40	105	16·84	1·53
25	Nephria	4	1	4	6	13	9	12	9	7	13	19	17	16	15	12	4	..	161	17·02	1·19	101	31·30	1·52	60	9·62	·87
26	Hydrocephalus ..	109	14	5	2	2	..	..	..	..	..	..	..	1	..	..	..	..	133	14·05	.98	71	22·00	1·07	62	9·94	·90
27	Want of Breast Milk ..	122	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	122	12·89	.90	73	22·62	1·10	49	7·86	·71
28	Tabes Mesenterica ..	102	1	1	2	..	1	1	..	..	..	1	..	..	..	..	..	..	109	11·52	·81	76	23·55	1·15	33	5·29	·48
29	Pleurisy	14	..	2	5	7	6	3	7	10	6	4	10	7	4	3	1	..	99	10·46	·73	50	15·49	·75	49	7·86	·71
30	Peritonitis	14	5	9	5	8	3	8	6	5	4	14	6	8	4	3	4	..	96	10·15	·71	41	12·70	·62	55	8·82	·80
31	Suicides	..	..	..	4	5	8	7	6	7	12	11	10	5	5	3	1	2	86	9·09	·64	35	10·85	·53	51	8·18	·74
32	Kidney Disease, &c. ..	5	2	..	..	2	7	3	3	5	5	6	6	10	6	7	9	1	77	8·14	·57	39	12·08	·59	38	6·09	·55
33	Alcoholism	..	..	..	..	1	7	8	7	11	15	10	5	8	4	1	..	..	77	8·14	·57	38	11·78	·57	39	6·25	·57
34	Teething	70	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	70	7·40	·52	21	6·51	·32	49	7·86	·71
35	Dropsy	4	1	1	2	4	1	1	1	3	3	6	3	9	7	7	12	..	65	6·87	·48	35	10·85	·53	30	4·81	·44
36	Epilepsy	17	1	1	4	4	6	6	2	6	2	6	2	3	2	1	2	..	65	6·87	·48	36	11·16	·54	29	4·65	·42
37	Laryngitis	38	12	1	1	..	..	1	..	..	1	1	3	2	1	..	..	..	61	6·45	·45	32	9·92	·48	29	4·65	·42
38	Rheumatism	2	7	3	..	5	1	4	1	2	4	3	5	11	4	6	2	..	60	6·34	·44	21	6·51	·32	39	6·25	·57
39	Hydatids	2	1	6	7	7	4	5	6	5	5	7	1	2	..	1	..	..	59	6·24	·44	21	6·51	·32	38	6·09	·55
40	Jaundice, &c.	22	2	1	1	..	..	2	3	1	9	4	1	4	4	2	2	..	58	6·13	·43	21	6·51	·32	37	5·93	·54
	Total	4456	558	231	381	573	513	392	431	479	633	728	655	663	566	495	713	6	12473	1318·36	92·36	6153	1906·78	92·83	6320	1013·78	91·90

[illegible] from the Forty most Prevalent Causes in the Colony of Victoria during the year 1885. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.	Melbourne & Suburbs. Total Deaths.	Melbourne & Suburbs. Rate per 100,000.	Melbourne & Suburbs. Percentage to Deaths from all Causes.	Country. Total Deaths.	Country. Rate per 100,000.	Country. Percentage to Deaths from all Causes.
1	Phthisis	29	11	22	100	205	229	135	115	112	107	125	96	52	35	6	4	1	1384	141·94	9·63	826	239·16	11·87	558	88·62	7·54
2	Pneumonia	260	22	11	34	37	42	37	52	47	66	79	73	68	54	38	45	1	966	99·07	6·72	469	135·79	6·74	497	78·92	6·71
3	Atrophy and Debility	865	3	2	2	1	3	1	..	1	9	22	16	30	..	..	..	..	955	97·94	6·65	566	163·88	8·13	389	61·78	5·25
4	Dis. of Circulatory Syst.	16	14	26	29	19	29	28	51	50	70	102	132	118	104	107	86	3	984	100·92	6·85	382	110·60	5·49	602	95·61	8·13
5	Diarrhoea & Dysentery	802	2	..	1	2	3	4	4	6	10	11	20	16	16	18	27	..	942	96·61	6·56	485	140·42	6·97	457	72·58	6·71
6	Accidents	118	36	38	47	40	45	41	31	44	47	57	53	35	25	14	19	4	724	74·25	5·04	257	74·42	3·69	467	74·17	6·31
7	Bronchitis	288	14	2	4	10	3	7	6	11	13	35	44	39	45	48	82	..	651	66·77	4·53	266	77·02	3·82	385	61·14	5·20
8	Old Age	..	..	..	..	..	..	..	..	..	..	..	..	..	76	124	393	..	593	60·82	4·13	203	58·77	2·92	390	61·94	5·27
9	Cancer	6	5	3	3	5	6	12	16	28	54	63	82	56	50	28	27	1	445	45·64	3·09	214	61·96	3·07	231	36·68	3·12
10	Typhoid & Infant. Fevers	47	41	48	58	81	48	25	22	9	14	8	8	6	3	3	3	..	424	43·48	2·95	183	52·98	2·63	241	38·27	3·25
11	Premature Birth ..	365	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	365	37·43	2·54	170	49·22	2·44	195	30·97	2·63
12	Brain Diseases, &c. ..	21	13	8	20	13	11	18	11	18	27	39	31	49	33	16	18	1	347	35·59	2·41	201	58·20	2·88	146	23·19	1·97
13	Apoplexy	4	..	..	4	6	5	10	11	20	31	42	49	52	37	28	34	..	333	34·15	2·32	172	49·80	2·47	161	25·57	2·17
14	Croup and Diphtheria	218	90	17	3	1	..	..	1	1	..	..	..	..	..	..	1	..	332	34·05	2·31	129	37·35	1·85	203	32·24	2·74
15	Gastritis, Stomach Dis.	219	2	..	4	6	8	2	5	7	5	7	16	17	4	8	7	..	317	32·51	2·21	208	6 ·22	2·99	109	17·31	1·47
16	Convulsions	312	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	316	32·41	2·20	174	50·38	2·50	142	22·55	1·92
17	Liver Disease, &c. ..	13	3	1	7	7	6	9	17	23	28	46	36	22	30	13	14	..	275	28·20	1·91	146	42·27	2·09	129	20·49	1·74
18	Cephalitis	179	20	9	8	8	7	6	4	3	2	4	4	3	1	4	3	1	266	27·28	1·85	172	49·80	2·47	94	14·93	1·28
19	Enteritis	181	7	7	3	6	4	2	7	4	7	9	8	6	1	6	..	..	258	26·46	1·80	110	31·85	1·58	148	23·50	1·99
20	Paralysis	1	2	3	2	1	1	3	6	16	12	20	22	25	27	31	38	..	210	21·54	1·46	93	26·93	1·34	117	18·58	1·58
21	Congestion of Lungs ..	83	7	3	2	7	4	5	4	5	8	8	10	9	21	14	14	1	205	21·02	1·43	97	28·08	1·39	108	17·15	1·46
22	Nephria	6	3	2	5	5	11	12	11	16	16	23	25	24	12	5	5	..	181	18·56	1·26	121	35·03	1·74	60	9·53	·81
23	Whooping Cough ..	162	2	1	1	..	..	..	1	..	..	..	..	1	..	..	..	..	168	17·23	1·17	38	11·00	·54	130	20·64	1·75
24	Childbirth and Metria	..	..	..	8	30	56	25	28	21	..	..	..	..	..	..	..	..	168	17·23	1·17	75	21·71	1·08	93	14·77	1·26
25	Hydrocephalus ..	116	29	7	2	2	4	..	1	..	..	..	..	..	..	..	..	..	161	16·51	1·12	100	28·95	1·44	61	9·69	·82
26	Want of Breast Milk ..	115	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	115	11·79	·80	72	20·85	1·03	43	6·83	·58
27	Pleurisy	7	6	3	3	6	4	5	14	9	7	8	12	10	5	1	13	..	113	11·59	·79	66	19·11	·95	47	7·46	·63
28	Teething	111	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	111	11·38	·77	50	14·48	·72	61	9·69	·82
29	Tabes Mesenterica ..	96	6	1	2	1	..	..	..	..	..	1	..	1	1	..	..	..	109	11·18	·76	70	20·27	1·00	39	6·19	·53
30	Alcoholism	..	..	..	..	3	10	14	8	20	17	12	4	3	1	5	1	1	99	10·15	·69	63	18·24	·90	36	5·72	·49
31	Suicides	..	..	..	..	8	8	8	6	9	7	12	8	11	9	1	2	..	89	9·13	·62	38	11·00	·54	51	8·09	·69
32	Epilepsy	11	2	1	3	9	7	4	12	1	4	8	5	5	3	2	2	..	79	8·10	·55	40	11·58	·57	39	6·19	·53
33	Peritonitis	8	2	9	7	9	9	4	..	1	4	3	4	7	4	2	5	..	78	7·99	·54	39	11·29	·56	39	6·19	·53
34	Influenza	29	1	3	4	2	1	2	2	2	2	5	3	2	4	4	8	..	74	7·59	1·51	15	4·34	·21	59	9·37	·80
35	Measles	56	7	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	69	7·08	.48	6	1·74	·08	63	8·00	·85
36	Laryngitis	41	12	..	3	..	1	3	..	1	2	..	1	1	1	1	..	..	67	6·87	.47	39	11·29	·56	28	4·45	·38
37	Asthma	1	..	..	..	1	1	3	..	5	8	8	12	7	8	5	6	..	65	6·67	.45	22	6·37	·32	43	6·83	·58
38	Kidney Disease, &c. ..	3	..	2	2	1	5	3	2	..	3	7	10	6	7	5	9	..	65	6·67	.45	34	9·84	·49	31	4·92	·42
39	Jaundice, Gall-stone, &c.	28	..	1	..	..	2	..	..	1	3	6	5	4	1	1	9	..	61	6·26	.42	30	8·69	·43	31	4·92	·42
40	Rheumatism	1	5	4	3	4	4	2	2	2	..	11	7	5	4	2	4	..	60	6·15	.42	20	5·79	·29	40	6·35	·54
	Total	1848	570	256	576	539	677	430	430	493	588	781	796	690	622	540	879	14	13224	1356·25	92·06	6461	1870·69	92·83	6763	1074·07	91·34

Return of Deaths from the Forty most Prevalent Causes in the Colony of Victoria during the year 1886. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.	Melbourne & Suburbs. Total Deaths.	Melbourne & Suburbs. Rate per 100,000.	Melbourne & Suburbs. Percentage to Deaths from all Causes.	Country. Total Deaths.	Country. Rate per 100,000.	Country. Percentage to Deaths from all Causes.
1	Phthisis	19	16	27	84	217	229	139	122	88	94	140	94	60	32	10	3	1	1375	139·30	9·20	790	212·58	10·41	585	95·05	7·95
2	Debility, Atrophy, Inanition	967	3	2	4	2	3	3	4	2	2	12	12	32	..	..	..	1	1049	106·27	7·01	68	166·29	8·14	431	70·03	5·85
3	Diarrhœa & Dysentery	868	6	2	2	6	5	3	2	6	10	12	16	18	19	14	31	1	1021	103·43	6·82	591	159·03	7·79	430	69·86	5·83
4	Dis. of Circulatory Syst	14	17	22	28	31	37	23	38	51	64	109	120	149	117	85	83	1	989	100·19	6.61	387	104·13	5·10	602	97·81	8·18
5	Pneumonia	260	22	10	18	28	25	50	37	50	50	80	65	70	62	29	47	..	903	91·48	6·04	455	122·43	5·99	448	72·79	6·08
6	Accidents	123	40	48	47	60	57	36	35	45	63	73	61	44	30	17	23	1	803	81·35	5·37	298	80·19	3·93	505	82·05	6·86
7	Bronchitis	293	7	6	1	6	5	6	3	8	27	45	39	56	57	44	85	..	688	69·70	4·60	267	71·84	3·52	421	68·40	5·72
8	Old Age	..	..	..	..	..	..	..	..	..	..	..	..	..	48	117	418	1	584	59·16	3·90	192	51·66	2·53	392	63·69	5·32
9	Typhoid Fever, &c. ..	46	51	53	85	96	90	28	27	13	7	11	8	9	..	1	4	..	529	53·59	3·54	297	79·91	3·85	232	37·69	3·15
10	Cancer	4	..	..	3	5	5	18	24	28	52	78	83	67	53	50	25	1	496	50·25	3·32	239	64·31	3·15	257	41·76	3·49
11	Liver Disease, &c. ..	44	5	2	9	4	16	20	22	29	42	58	54	44	35	25	16	..	425	43·05	2·84	232	62·43	3·06	193	31·36	2·62
12	Premature Birth ..	367	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	367	37·18	2·45	201	54·09	3·65	166	26·97	2·25
13	Apoplexy	3	3	..	2	3	12	13	8	11	31	45	58	51	44	40	39	1	367	37·18	2·45	186	50·04	2·45	181	29·41	2·46
14	Convulsions	324	7	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	333	33·73	2·23	193	51·93	2·54	140	22·75	1·90
15	Inflammation of Brain	166	32	13	13	11	9	6	6	7	7	10	4	2	3	3	3		295	29·88	1·97	200	53·82	2·63	95	15·43	1·29
16	Croup and Diphtheria	152	104	9	5	..	3	3	4	..	..	..	..	1	..	..	..	..	281	28·47	1·88	104	27·99	1·37	177	28·75	2·40
17	Diseases of Stomach ..	198	3	1	3	4	4	2	4	2	7	6	10	4	12	5	5	..	270	27·35	1·80	174	46·82	2·29	96	15·60	1·30
18	Paralysis	6	6	1	4	5	8	6	2	14	16	19	26	32	31	29	51	..	256	25·93	1·71	83	22·33	1·09	173	28·11	2·35
19	Enteritis	141	4	6	3	6	4	2	1	4	2	10	5	5	13	5	5	..	216	21·88	1·44	107	28·79	1·41	109	17·71	1·48
20	Whooping Cough ..	207	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	209	21·17	1·40	127	34·17	1·67	82	13·32	1·09
21	Childbirth and Metria	..	..	..	3	39	63	38	28	19	1	..	1	..	..	..	..		192	19·45	1·28	81	21·79	1·07	111	18·03	1·51
22	Congestion of Lungs ..	100	8	2	..	..	6	4	8	2	5	9	11	10	8	8	5	..	186	18·84	1·24	87	23·41	1·15	99	16·08	1·34
23	Hydrocephalus ..	156	16	4	5	3	1	..	..	..	..	..	..	..	..	..	..	..	185	18·74	1·24	113	30·41	1·49	72	11·70	·98
24	Brain Disease, &c. ..	26	8	4	2	3	5	8	7	13	14	20	22	13	12	14	9	1	181	18·34	1 21	118	31·75	1·55	63	10·24	·85
25	Bright's Disease ..	3	..	4	8	3	12	..	15	19	15	18	21	26	11	8	16	..	179	18·13	1·20	122	32·83	1·61	57	9·26	·77
26	Teething	158	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..	158	15 81	1·06	62	16·68	·82	96	15·60	1·30
27	Tabes Mesenterica ..	123	6	2	..	1	1	..	..	..	2	1	2	1	1	..	1	..	141	14·28	·94	113	30·41	1·49	28	4·55	·38
28	Pleurisy	21	3	..	7	7	7	7	9	6	8	14	7	5	9	6	4	..	120	12·16	·80	54	14·53	·71	66	10·72	·90
29	Peritonitis	12	6	2	11	14	4	6	3	7	7	9	7	7	10	3	2	..	110	11·14	·73	41	11·03	·54	69	11·21	·94
30	Alcoholism	..	..	..	..	4	8	13	13	17	18	11	8	9	5	1	..	..	107	10·84	·71	65	17·49	·86	42	6·82	·57
31	Cholera	97	1	.	..	..	1	1	1	..	..	2	1	1	1	..	..	..	106	10·74	·71	51	13·72	·67	55	8·93	·75
32	Suicides	..	..	..	3	7	11	9	10	6	12	5	15	10	8	1	2	2	101	10·23	·67	42	11·30	·55	59	9·59	·80
33	Insanity	..	..	1	2	5	3	7	11	9	16	5	11	4	6	4	12	..	96	9·72	·64	68	18·30	·89	28	4·55	·38
34	Epilepsy	19	1	4	6	7	9	9	4	1	4	2	6	3	2	1	1	..	79	8·00	·53	49	13·18	·64	30	4·87	·41
35	Asthma	1	1	1	1	1	1	2	1	4	5	8	10	10	11	4	10	..	71	7·19	·47	26	6·99	·34	45	7·31	·61
36	Starvation, Want Breast Milk	59	..	..	..	..	..	..	..	..	3	1	3	2	..	..	1	.	69	6·99	.46	37	9·96	·49	32	5·20	·43
37	Other Dis. of Resp. Organs	5	1	..	1	2	5	4	4	1	5	6	5	5	5	7	3	1	60	6·08	·40	21	5.65	·28	39	6·34	·53
38	Ileus	13	1	3	3	2	5	3	2	1	1	4	4	3	3	2	5	..	55	5·57	·37	23	6·19	·30	32	5·20	·43
39	Erysipelas	21	..	4	..	..	1	..	1	5	3	2	3	7	2	4	2	..	55	5·57	·37	34	9·14	·45	21	3·41	·28
40	Rheumatism	2	6	4	2	2	2	2	..	2	1	6	4	6	7	3	5	..	54	5·47	·36	20	5·38	·26	34	5·52	·46
	Total	5018	386	238	365	584	657	471	456	473	594	831	797	766	657	540	916	12	13761	1394·09	92·03	6968	1874·98	91·80	6793	1103·72	92·27

Return of Deaths from the Forty most Prevalent Causes in the Colony of Queensland during the year 1884. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.
1	Dysentery and Diarrhœa	499	8	10	307	306	92	56	23	25	6	13	7	8	4	2	7	4	1377	361·01	20·05
2	Phthisis	16	3	6	76	160	119	54	40	31	26	17	13	5	2	...	...	4	572	191·50	8·33
3	Typhoid Fever	53	26	33	81	106	132	56	24	23	10	7	4	6	1	...	1	...	563	188·49	8·20
4	Accidents	57	25	24	35	45	58	41	36	39	23	19	17	7	6	4	1	7	444	148·65	6·47
5	Atrophy and Debility	365	4	...	15	25	7	2	3	6	1	6	3	1	...	...	...	...	438	146·64	6·38
6	Convulsions	339	1	...	...	...	...	...	...	...	...	...	...		...	...	.	...	340	113·83	4·95
7	Pneumonia	52	3	5	43	62	37	25	14	12	10	9	7	4	2	2	.	...	287	96·08	4·18
8	Diseases of Circulatory System ...	2	7	4	9	23	15	16	28	26	22	25	17	16	10	10	9	3	242	81·02	3·53
9	Teething	156	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		156	52·23	2·27
10	Remittent Fever	13	2	...	24	52	22	12	3	8	5	4	2	1	1	1	..	..	150	50·18	2·19
11	Old Age	...	..	...	...	...	...	...	...	...		2	4	15	22	30	67	..	140	46·87	2·04
12	Bronchitis	77	3	..	4	10	7	8	3	1	4	2	5	4	5	5	2	.	140	46·87	2·04
13	Croup and Diphtheria	111	17	4	..	1	...	1	1	...	.	...	...	...	...	..	..	..	135	45·20	2·57
14	Lung Disease, &c.	19	1	1	10	21	18	5	5	5	6	4	4	3	1	...	1	...	104	34·82	1·51
15	Cancer	1	1	...	1	4	7	6	9	12	11	12	7	9	8	5	1	...	94	31·47	1·97
16	Premature Birth	91	...	...	...	...	...	...	...	..	...	...	..	...	...	...	...	...	91	30·47	1·33
17	Brain Disease, &c.	44	1	3	6	2	4	2	2	7	3	6	1	1	1	...	...	...	83	27·79	1·21
18	Cephalitis	55	4	5	4	7	3	2	2	...	1	...	...	...	...	..	...	...	83	27·79	1·21
19	Tuberculosis and Scrofula	17	...	2	11	23	14	4	...	...	...	1	...	...	...	...	...	...	72	24·10	1·05
20	Enteritis	31	4	3	7	5	4	2	1	7	...	2	1	...	1	...	...	...	68	22·76	·99
21	Childbirth and Metria	...	...	...	3	13	21	10	11	6	3	...	..	...	...	...	...	...	67	22·43	·98
22	Apoplexy	...	...	...	1	2	5	9	8	5	8	8	4	6	2	2	3	...	63	21·09	·92
23	Gastritis and Stomach Disease ...	40	...	2	2	...	4	...	2	3	1	2	1	2	...	...	...	...	59	19·75	·86
24	Tabes Mesenterica	51	3	...	1	...	1	1	...	1	...	...	...	...	...	...	..	...	58	19·42	·84
25	Liver Disease, &c.	3	1	...	1	5	3	3	6	7	11	7	5	3	...	1	1	..	57	19·08	·83
26	Alcoholism	...	...	...	1	2	4	5	11	7	8	12	3	1	2	...	...	...	56	18·74	·82
27	Suicides	...	...	...	1	7	7	7	5	7	2	4	2	3	...	...	...	...	45	15·06	·65
28	Dropsy	3	2	1	3	4	2	1	3	1	5	6	4	3	3	...	2	2	45	15·06	·65
29	Privation	6	...	...	...	5	...	3	1	8	3	6	1	2	1	...	...	6	42	14·06	·61
30	Paralysis	1	...	...	2	4	1	1	3	3	2	5	4	4	5	1	5	1	42	14·06	·61
31	Pleurisy	...	1	..	9	13	8	4	2	...	2	...	...	...	1	...	..	...	40	13·39	·58
32	Peritonitis	2	...	2	5	12	4	2	2	5	1	...	...	...	...	...	...	1	36	12·05	·52
33	Syphilis	12	...	...	6	7	6	2	...	2	...	1	...	...	...	...	...	...	36	12·05	·52
34	Purpura and Scurvy	4	1	...	8	12	4	1	...	...	...	2	...	...	...	1	...	1	34	11·38	·49
35	Hydrocephalus	28	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	32	10·71	·47
36	Asthma	2	..	...	...	...	...	...	2	3	6	3	4	5	3	1	...	...	29	9·71	·42
37	Ague	2	1	...	3	11	5	...	1	2	1	1	...	...	...	...	...	...	27	9·04	·39
38	Epilepsy	5	...	2	1	3	...	1	5	3	4	1	...	...	1	..	...	...	26	8·75	·38
39	Ileus	9	1	...	2	1	1	2	...	...	2	...	1	2	3	1	...	...	25	8·37	·36
40	Rheumatism	...	1	2	5	3	1	6	1	1	1	2	2	...	...	...	...	...	25	8·37	·36
	Total	2166	123	110	688	956	616	350	257	266	188	189	123	111	85	66	100	29	6423	2150·36	93·62

Return of Deaths from the Forty most Prevalent Causes in the Colony of Queensland during the year 1885. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.
1	Diarrhœa and Dysentery	431	7	3	59	61	31	11	8	17	5	9	9	6	6	4	1	5	673	211·36	10·79
2	Phthisis	9	3	6	83	138	116	93	37	40	28	12	9	8	4	2	1	4	593	186·23	9·51
3	Typhoid and Simple Fever	27	23	20	87	128	92	57	33	23	14	16	9	5	1	2	..	4	541	169·90	8·68
4	Accidents	63	25	20	33	43	55	38	27	36	25	24	13	11	4	2	3	13	435	136·61	6·98
5	Atrophy, Debility, and Inanition	363	2	..	3	12	4	7	2	3	2	2	2	..	..	..	..	..	402	126·25	6·44
6	Convulsions	346	2	1	2	..	..	..	..	1	..		..	..	..	..		..	352	110·55	5·64
7	Diseases of Circulatory System	5	4	5	11	19	20	28	26	37	25	29	12	12	20	7	7	3	270	84·79	4·33
8	Pneumonia	31	4	3	26	43	42	16	8	12	9	15	8	5	6	4	..	2	234	73·49	3·75
9	Croup and Diphtheria	165	35	1	4	..	1	1	1	..	..	..	..	..	..	..	..	..	208	65·32	3·34
10	Teething	180	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	180	56·53	2·89
11	Lung Disease, &c.	41	1	..	5	17	19	11	10	8	6	9	4	4	2	1	3	2	143	44·91	2·29
12	Bronchitis	84	3	1	5	6	4	..	1	3	3	4	6	9	3	2	4	1	139	43·65	2·23
13	Old Age	..	..	..	..	..	..	..	..	..	..	4	2	15	16	32	60	1	130	40·83	2·08
14	Premature Birth	120	..	..	..	..	..	..	..	..	..	..		..	..	..	..	..	120	37·69	1·92
15	Liver Disease, &c.	15	2	1	4	5	7	8	7	18	16	7	8	5	1	..	2	1	107	33·60	1·72
16	Tuberculosis and Scrofula	13	2	1	27	35	14	5	3	..	1	..	..	..	..	..	..	..	101	31·72	1·62
17	Enteritis	64	2	2	2	6	3	1	2	2	1	1	2	..	..	1	..	..	89	27·95	1·43
18	Tabes Mesenterica	58	5	.	6	9	5	1	1	2	..				..	..	..	..	87	27·32	1·39
19	Cephalitis	41	7	..	8	4	7	2	1	5	3	4	..		..	1	..	1	84	26·38	1·35
20	Disease of Stomach	45	..	1	2	5	4	3	3	3	1	2	4	1	1	1	..	1	77	24·18	1·23
21	Alcoholism	..	..	..	..	2	6	4	9	16	10	7	7	2	5	1	2	1	72	22·61	1·15
22	Chilbirth and Metria	..	..	..	2	13	16	16	14	6	2	..	..	..	..	..	..	..	69	21·67	1·11
23	Brain Disease, &c.	26	2	..	3	4	5	2	1	2	5	1	2	1	2	..	3	2	61	19·16	·98
24	Apoplexy	..	..	..	3	..	3	8	5	7	2	8	5	8	3	3	1	1	57	17·90	·91
25	Cancer	..	..	1	1	2	2	3	7	6	5	7	8	2	3	2	3	1	53	16·64	·85
26	Peritonitis	2	..	1	8	8	9	6	3	4	3	1	1	.	..	..	1	..	47	14·76	·75
27	Paralysis, &c.	2	..	..	2	1	2	1	2	6	2	7	7	8	3	3	..	..	46	14·45	·74
28	Ileus	17	..	1	2	1	5	3	3	..	5	4	1	1	..	..	..	..	43	13·50	·69
29	Pleurisy	1	1	..	7	15	6	5	1	2	2	1	..	..	..	..	..		41	12·88	·66
30	Syphilis	10	..	..	3	6	4	6	1	3	1	1	..	1	..	..	..	1	37	11·62	·59
31	Suicides	..	..	..	..	4	6	6	4	5	3	3	2	2	..	..	..	1	36	11·31	·58
32	Hydrocephalus	26	3	..	1	1	..	..	..	1	..	..	..	.	..	..	..	..	32	10·05	·51
33	Remittent Fever	10	1	..	3	2	2	3	1	3	..	1	..	1	1	..	1	..	29	9·11	·46
34	Whooping Cough	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28	8·79	·45
35	Want of Breast Milk	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28	8·79	·45
36	Bright's Disease	1	..	..	3	5	2	..	2	3	1	4	3	1	1	..	1	1	28	8·79	·45
37	Asthma	4	..	..	..	..	1	..	1	2	3	2	3	4	2	1	2	..	25	7·85	·40
38	Cholera	23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23	7·22	·37
39	Influenza	10	..	1	2	1	1	3	1	1	1	1	..	..	1	..	..	..	23	7·22	·37
40	Epilepsy	7	..	..	1	1	1	..	1	4	..	2	2	..	..	..	1	..	20	6·28	·32
	Total	2296	134	69	408	597	495	348	226	281	184	188	129	112	85	69	96	46	5763	1809·90	92·43

Return of Deaths from the Forty most Prevalent Causes in the Colony of Queensland during the year 1886. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000	Whole Colony. Percentage to deaths from all Causes.
1	Diarrhœa and Dysentery	387	4	2	33	32	18	13	8	8	10	7	2	13	5	4	2	3	551	165·70	9·70
2	Phthisis	4	2	1	51	123	95	61	37	38	24	20	14	16	2	...	1	5	494	148·57	8·86
3	Accidents	71	21	16	25	56	56	39	25	28	18	23	10	11	9	3	3	20	434	130·52	7·78
4	Typhoid Fever	32	18	13	43	86	87	34	26	17	16	12	9	4	2	...	..	9	408	120·70	7·32
5	Convulsions	320	2	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	322	96·84	5·77
6	Atrophy and Debility and Inanition	263	...	...	3	4	3	...	3	2	4	3	5	5	1	...	...	1	297	89·32	5·33
7	Diseases of Circulatory System ...	7	7	9	11	17	23	17	28	41	25	29	21	23	12	10	9	3	292	87·82	5·24
8	Croup and Diphtheria	169	27	1	..	1	1	1	...	...	...	..	...	...	...	..	...	...	200	60·15	3·59
9	Teething	182	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	182	54·73	3·26
10	Pneumonia	41	2	...	14	17	11	7	11	9	3	9	5	3	...	1	2	...	135	40·60	2·42
11	Premature Birth	133	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	133	39·99	2·38
12	Old Age	...	...	...	..	...	...	..	...	...	...	...	2	12	16	26	64	...	120	36·09	2·15
13	Bronchitis	68	4	...	2	4	2	...	1	6	3	7	3	5	6	1	7	...	119	35·79	2·13
14	Enteritis	82	2	1	1	...	3	2	3	4	...	2	5	...	...	...	...	1	106	31·88	1·90
15	Tuberculosis, &c.	12	...	...	21	34	15	14	2	1	2	1	..	...	...	...	...	...	102	30·67	1·83
16	Cancer	...	...	...	3	1	2	4	8	10	13	18	15	8	4	2	3	1	92	27·67	1·65
17	Lung Disease, &c.	42	6	...	1	7	6	6	3	1	6	4	2	3	1	1	1	1	91	27·37	1·63
18	Liver Disease, &c.	11	1	..	2	2	4	2	8	9	8	13	7	4	4	2	1	1	79	23·76	1·42
19	Cephalitis	37	2	4	5	7	2	2	2	6	3	2	2	1	...	...	...	...	75	22·55	1·34
20	Brain Disease, &c.	23	1	1	4	2	5	1	5	4	12	3	2	4	2	3	...	...	72	21·65	1·29
21	Childbirth	...	...	...	2	13	19	14	14	6	2	...	...	...	...	...	...	...	70	21·05	1·25
22	Whooping Cough	61	1	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	62	18·65	1·11
23	Tabes Mesenterica	51	...	1	3	2	1	2	1	...	...	...	...	...	...	...	...	...	61	18·34	1·09
24	Alcoholism	...	...	...	...	3	7	3	12	9	6	8	6	1	1	...	...	2	58	17·44	1·04
25	Disease of Stomach	34	...	...	1	4	4	...	1	1	1	...	4	2	3	1	...	...	56	16·24	1·00
26	Apoplexy	...	...	...	...	1	2	1	4	7	10	5	4	6	4	3	3	...	50	15·04	·90
27	Paralysis, &c.	5	...	2	1	1	2	3	1	3	3	3	6	6	5	2	5	...	48	14·36	·86
28	Suicides	...	...	...	1	5	10	9	6	4	3	2	...	1	1	...	...	2	44	13·23	·79
29	Ague	6	1	3	4	7	8	3	4	1	2	1	...	...	...	...	...	1	41	12·23	·73
30	Hydrocephalus	35	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	37	11·13	·66
31	Peritonitis	2	2	1	7	8	3	1	1	3	1	2	1	2	1	1	...	1	37	11·13	·66
32	Cholera	19	3	...	1	3	...	4	2	1	1	1	...	1	1	...	...	...	37	11·13	·66
33	Want of Breast Milk	34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	34	10·22	·61
34	Pleurisy	2	1	1	4	10	5	5	3	2	...	...	..	...	...	...	...	...	33	9·92	·59
35	Remittent Fever	7	5	...	2	2	4	3	1	3	2	...	1	...	...	...	...	...	30	9·02	·54
36	Bright's Disease	1	...	...	...	3	2	4	1	5	3	3	1	3	2	2	...	...	30	9·02	·54
37	Syphilis	6	...	...	1	7	4	4	2	2	...	...	2	...	...	...	...	1	29	8·72	·52
38	Epilepsy	4	2	2	...	6	2	2	3	...	3	1	...	1	...	1	...	...	27	8·12	·48
39	Laryngitis	17	5	...	2	1	1	...	...	...	...	1	...	...	...	...	...	...	27	8·12	·48
40	Privation	1	...	...	...	1	3	4	3	2	2	3	1	...	...	...	1	6	27	8·12	·48
	Total	2169	119	58	248	471	411	265	229	233	186	183	130	135	82	63	102	58	5142	1546·42	92·23

Return of Deaths from the Forty most Prevalent Causes in the Colony of South Australia during the year 1884. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.
1	Diarrhœa and Dysentery	385	5	1	..	3	5	1	2	3	3	3	..	4	2	3	2	..	422	134·91	8·81
2	Debility, Atrophy, and Inanition ..	353	1	2	..	..	..	..	..	3	2	1	10	1	2	1	4	..	380	121·49	7·93
3	Phthisis	11	4	8	33	61	51	44	32	19	16	22	11	3	6	..	2	..	323	103·27	6·74
4	Old Age	..	..	..	..	..	..	..	..	..	..	..	..	19	35	74	149	..	277	88·56	5·78
5	Diseases of Circulatory System ..	10	9	10	8	12	19	19	14	15	20	23	33	22	26	13	6	..	259	82·80	5·41
6	Pneumonia	103	10	5	10	7	10	14	14	13	9	8	10	4	6	4	2	..	229	73·21	4·78
7	Bronchitis	153	7	4	2	2	..	3	..	4	3	3	3	3	9	10	16	..	222	70·98	4·63
8	Accidents	41	13	15	15	12	22	15	16	7	10	4	12	6	5	4	6	..	203	64·90	4·24
9	Diphtheria and Croup	158	32	3	1	1	..	..	..	1	..	..	..	..	..	..	..	..	196	62·66	4·09
10	Convulsions	186	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	188	60·10	3·92
11	Enteric Fever, &c.	27	14	18	26	28	14	9	2	4	4	2	..	1	1	1	..	..	151	48·28	3·15
12	Measles	116	16	2	..	..	4	1	..	..	..	..	..	..	..	..	..	..	139	44·44	2·90
13	Brain Disease, &c.	54	8	3	4	3	3	4	8	4	4	8	4	6	10	3	4	..	130	41·56	2·71
14	Cancer	1	..	1	..	..	4	3	6	13	12	14	13	16	12	10	4	..	109	34·85	2·28
15	Premature Birth	102	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	102	32·61	2·13
16	Teething	101	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	101	32·29	2·11
17	Enteritis	62	3	1	2	2	3	1	..	..	3	1	3	3	2	..	..	..	86	27·49	1·79
18	Liver Disease, &c.	11	..	..	1	..	..	7	9	12	8	9	5	12	2	5	1	..	82	26·22	1·71
19	Cephalitis	49	7	4	2	2	1	..	2	2	..	2	1	1	..	..	..	..	73	33·34	1·52
20	Apoplexy	2	1	1	..	1	3	4	1	3	2	6	4	16	12	7	9	..	72	23·02	1·50
21	Other Diseases of Respiratory Organs	32	3	3	1	6	3	4	4	4	1	2	2	4	..	3	..	..	72	23·02	1·50
22	Tabes Mesenterica	60	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	61	19·50	1·27
23	Whooping Cough	51	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	53	16·94	1·11
24	Paralysis, &c.	2	1	..	..	2	2	2	4	1	7	4	5	7	5	5	6	..	53	16·94	1·11
25	Childbirth and Metria	..	..	..	1	13	11	11	10	3	..	..	..	..	..	..	..	..	49	15·66	1·02
26	Hydrocephalus	35	7	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	47	15·03	·98
27	Peritonitis	6	1	1	2	6	7	9	2	1	..	4	4	1	2	..	..	..	46	14·71	·96
28	Want of Breast-milk and Starvation	36	..	..	..	1	2	2	1	2	..	..	..	..	..	..	..	..	44	14·07	·92
29	Dropsy	7	..	..	..	1	..	2	1	3	1	1	5	3	3	4	5	..	36	11·51	·75
30	Suicides	..	..	..	3	3	4	3	4	3	2	3	..	5	..	..	1	..	31	9·91	·65
31	Scarlet Fever	20	7	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	29	9·27	·60
32	Bright's Disease	1	..	6	3	3	..	1	3	..	3	2	4	1	1	..	..	..	28	8·95	·58
33	Disease of Stomach	12	..	..	..	..	..	2	..	..	1	2	2	1	2	3	2	..	27	8·63	·56
34	Epilepsy	..	2	2	4	2	2	1	2	1	..	2	2	1	1	..	..	..	22	7·03	·46
35	Asthma	..	..	..	..	..	1	1	..	1	1	6	4	..	3	2	2	..	21	6·71	·44
36	Rheumatism	3	3	1	1	..	3	..	..	2	3	..	1	..	2	..	..	..	19	6·07	·40
37	Thrush	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	5·43	·35
38	Anæmia, &c.	12	..	1	..	..	1	1	1	..	..	..	..	1	..	..	..	..	17	5·43	·35
39	Simple Cholera	12	..	..	1	..	1	..	..	2	..	..	..	..	..	..	..	..	16	5·11	·33
40	Nephritis	1	3	..	1	2	1	2	1	1	2	1	..	1	..	..	..	..	16	5·11	·33
	Total	2232	162	96	124	173	177	166	139	127	117	133	138	142	149	152	221	..	4448	1422·08	92·88

... the Forty most Frequent Causes in the Colony of South Australia during the year 1885. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to deaths from all Causes.
1	Diarrhœa and Dysentery	268	2	..	..	1	2	1	1	2	8	2	4	4	5	6	9	..	315	98·51	7·90
2	Phthisis	12	7	22	52	41	37	39	29	21	20	10	8	6	2	..	1		307	96·01	7·70
3	Atrophy, Debility, and Inanition ..	287	..	1	..	..	..		1	2	2	..	6	4	2	2	..	..	307	96·01	7·70
4	Diseases of Circulatory System ..	9	11	6	9	3	4	12	7	12	24	21	22	27	28	19	25		239	74·74	5·99
5	Old Age	..	..	..	..	..	..	..	..	..	..	..	1	15	25	43	150	..	234	73·18	5·87
6	Pneumonia	84	6	6	9	7	18	10	10	13	9	8	9	10	7	6	5	..	217	67·86	5·44
7	Diphtheria and Croup	146	36	3	1	1	1	..	..	..	..	..	..	..	..	..	..	..	188	58·79	4·71
8	Accidents	31	16	12	7	16	15	13	7	13	13	6	9	5	2	3	3	..	171	53·48	4·29
9	Convulsions	155	2	2	..	..	..	1	..	..	1	..	..	..	..	..	..	.	161	50·35	4·04
10	Bronchitis	98	4	..	2	2	1	3	1	2	7	4	2	6	9	10	10	..	161	50·35	4·04
11	Typhoid Fever, &c.	21	11	10	25	36	16	8	8	2	4	2	1	1	..	..	..	..	145	45·34	3·64
12	Cancer	1	1	..	1	..	2	3	9	7	15	11	12	14	13	5	6	..	100	31·27	2·51
13	Whooping Cough	87	3	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	90	28·14	2·26
14	Premature Birth	88	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	88	27·52	2·21
15	Liver Disease, &c.	10	3	1	..	3	2	8	5	8	12	8	9	9	6	2	1	..	87	27·21	2·18
16	Teething	79	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	79	24·70	1·98
17	Inflammation of Brain	45	9	..	4	..	..	1	..	3	5	2	1	1	1	..	..	..	72	22·52	1·80
18	Enteritis	45	2	2	..	2	2	2	..	.	..	3	3	1	..	2	..	..	64	20·01	1·60
19	Brain Disease, &c.	27	..	..	4	..	2	1	3	2	3	2	3	4	6	2	3	..	62	19·39	1·55
20	Hydrocephalus..	48	8	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	60	18·76	1·50
21	Apoplexy	3	..	2	..	1	2	1	2	6	2	1	3	9	12	9	5	..	58	18·14	1·45
22	Paralysis, &c.	1	1	1	1	1	1	3	2	2	2	6	10	4	8	8	4	..	55	17·20	1·38
23	Childbirth and Metria	..	..	..	2	13	10	11	12	4	1	..	..	..	..	..	..	..	53	16·57	1·32
24	Tabes Mesenterica	49	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	50	15·64	1·25
25	Other Diseases of Respiratory Organs	10	1	..	1	2	1	4	2	2	3	2	1	2	1	..	1	..	33	10·32	·83
26	Suicides	..	..	..	1	3	7	2	1	3	5	2	2	3	2	..	..	1	32	10·01	·80
27	Want of Breast Milk	29	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	29	9·07	·73
28	Peritonitis	6	4	..	2	1	6	1	1	3	1	..	..	1	1	..	1	..	28	8·76	·70
29	Bright's Disease	1	.	1	2	..	..	..	3	2	3	1	3	3	3	2	2	..	26	8·13	·65
30	Dropsy	4	..	..	..	..	..	1	1	1	4	1	1	2	3	1	3	..	22	6·88	·55
31	Simple Cholera	16	..	..	..	..	..	..	..	..	..	2	..	..	..	..	1	..	19	5·94	·48
32	Insanity	..	..	..	..	..	1	2	5	4	4	2	..	..	..	..	..	..	18	5·63	·45
33	Asthma	2	..	..	..	1	..	..	..	..	..	3	1	5	3	1	2	..	18	5·63	·45
34	Other Diseases of Urinary System ..	1	..	..	4	1	1	..	1		1	2	1	1	2	..	2	..	18	5·63	·45
35	Disease of Stomach	7	1	..	..	..	1	1	1	..	1	..	1	1	1	1	2	..	18	5·63	·45
36	Anaemia, &c	11	..	1	..	..	2	..	2	1	..		..	..	..	..	..	..	17	5·32	·43
37	Other Diseases of Digestive System	10	..	..	..	..	..	..	1	1	..	1	..	..	1	..	2	..	16	5·00	·40
38	Rheumatism	1	1	2	..	..	1	1	1	1	1	1	1	2	1	1	..	..	15	4·69	·38
39	Diseases of Bladder	1	..	..	..	1	..	2	..	..	1	..	..	1	2	4	1	..	13	4·06	·32
40	Laryngitis	9	1	2	..	..	..	..	..	..	1	..	..	..	..	..	..	..	13	4·06	·32
	Total	1702	130	75	129	138	135	131	116	118	153	103	114	141	146	127	239	1	3698	1156·45	92·70

Return of Deaths from the Forty most Prevalent Causes in the Colony of South Australia during the year 1886. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000	Whole Colony. Percentage to Deaths from all Causes.
1	Phthisis	9	1	2	18	60	55	62	35	24	24	19	11	11	5	1	2	..	339	108·50	8·00
2	Debility, Atrophy, and Inanition ..	300	..	..	..	..	2	..	3	1	1	3	2	1	..	1	1	..	315	100·82	7·44
3	Diarrhœa and Dysentery	267	4	..	2	2	2	3	3	2	4	3	3	2	3	2	5	..	307	98·26	7·25
4	Old Age	..	..	..	..	..	..	..	..	..	..	..	..	9	30	69	173	1	282	90·26	6·66
5	Diseases of Circulatory System ..	8	6	12	9	5	11	14	20	21	16	24	31	24	35	23	16	..	275	88·02	6·49
6	Accidents	43	18	9	18	12	24	23	13	21	10	15	6	9	5	4	5	5	240	76·81	5·67
7	Pneumonia	87	3	2	4	5	5	14	8	14	5	7	4	8	6	3	5	..	180	57·61	4·25
8	Convulsions	170	3	1	..	2	.	..	..	..	..	..	..	..	..	..	1	..	177	56·65	4·18
9	Bronchitis	110	2	2	..	..	1	1	2	..	..	3	4	9	7	9	10	..	160	51·21	3·78
10	Diphtheria and Croup	80	32	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	117	37·44	2·76
11	Enteric Fever, &c.	12	3	7	19	18	17	11	7	2	2	4	3	1	..	..	..	..	106	33·93	2·50
12	Cancer	1	..	..	.	1	1	5	6	12	10	16	12	9	13	9	9	..	104	33·29	2·46
13	Teething	101	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	101	32·33	2·38
14	Enteritis	69	2	1	3	2	2	1	1		2	2	2	2	2	1	2	..	94	30·08	2·22
15	Whooping Cough	90	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	93	29·76	2·20
16	Premature Birth	93	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	93	29·76	2·20
17	Inflammation of the Brain	54	10	2	2	2	5	2	1	..	3	..	1	1	1	..	1	..	85	27·20	2·01
18	Liver Disease, &c.	10	..	..	..	..	1	3	5	3	9	8	16	4	8	4	5	..	76	24·32	1·79
19	Apoplexy	5	..	..	..	..	2	2	3	4	2	13	8	11	7	7	8	..	72	23·04	1·70
20	Brain Disease, &c.	26	3	1	2	2	1	5	4	2	7	..	6	1	2	3	3	..	68	21·76	1·61
21	Hydrocephalus	37	14	4	1	1	2	..	..	..	..	..	.	..	..	.	..	..	59	18·88	1·39
22	Paralysis, &c.	1	..	..	..	1	1	1	3	1	2	2	5	7	7	5	13	..	49	25·68	1·16
23	Want of Breast Milk	44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	44	14·08	1·04
24	Tabes Mesenterica	42	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	43	13·76	1·01
25	Other Diseases of Respiratory Organs	16	..	..	3	3	2	3	2	1	1	..	1	2	1	3	2	..	40	12·80	·94
26	Childbirth and Metria	..	..	..	3	4	5	7	8	8	1	..	..	..	..	..	..	..	36	11·52	·85
27	Insanity	1	..	..	3	..	..	2	8	8	4	..	2	4	2	1	..	..	35	11·20	·83
28	Bright's Disease	..	.	..	2	..	2	3	4	3	2	3	5	3	4	1	2	..	34	10·88	·80
29	Peritonitis	6	2	3	2	3	3	3	2	..	1	.	3	1	2	..	1	.	32	10·24	·75
30	Suicides	..	..	1	2	1	3	4	4	2	4	1	1	5	1	1	1	..	31	9·92	·73
31	Epilepsy	2	..	..	2	2	3	2	..	3	1	1	3	3	..	..	1	..	23	7·36	·54
32	Simple Cholera	17	..	..	..	..	..	1	..	..	..	..	..	3	..	..	..	..	21	6·72	·49
33	Pleurisy	3	1	..	2	1	2	2	..	..	2	2	3	1	..	1	..	..	20	6·40	·47
34	Disease of Stomach	6	..	..	1	2	1	..	1	2	1	2	..	3	..	1	..	..	20	6·40	·47
35	Nephritis	8	2	..	1	2	1	..	1	1	1	1	1	1	..	..	..	..	20	6·40	·47
36	Other Congenital Defects	18	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	6·08	·45
37	Ileus	2	1	2	1	2	1	1	4	..	..	2	..	1	1	..	..	..	18	5·76	·42
38	Hydatid Disease	..	1	2	..	2	6	3	2	1	..	..	1	..	..	..	..	..	18	5·76	·42
39	Pyæmia	2	..	..	..	2	..	5	2	2	1	1	1	1	..	..	.	..	17	5·44	·40
40	Scrofula	7	2	2	..	..	1	..	..	2	..	1	1	..	..	..	..	..	16	5.12	·38
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	140	116	133	136	137	142	149	266	6	3879	1241·52	91·61

[illegible] from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000	Whole Colony. Percentage to Deaths from all Causes.
1	Phthisis	16	11	11	47	74	72	62	60	42	33	33	18	7	7	2	2	1	498	90·12	8·67
2	Accidents	97	28	29	29	30	29	28	47	30	37	36	19	9	13	9	5	3	478	86·50	8·33
3	Atrophy, Debility, and Inanition ...	327	1	2	...	...	...	3	4	1	5	1	7	...	.	...	.	...	351	63·52	6·11
4	Diseases of Circulatory System ...	12	3	11	4	12	12	22	26	26	33	32	32	27	35	17	24	2	330	59·72	5·75
5	Pneumonia	90	15	3	12	8	19	6	12	21	23	20	19	7	14	6	7	2	284	51·39	4·95
6	Bronchitis	166	7	4	2	...	...	3	2	5	6	11	11	9	20	14	15	...	275	49·76	4·79
7	Diarrhœa and Dysentery	183	...	2	...	1	2	1	2	...	2	5	2	2	1	..	4	...	207	37·46	3·61
8	Premature Birth	198	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	198	35·83	3·45
9	Convulsions	190	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	193	34·92	3·36
10	Cancer	1	2	1	2	...	3	4	8	27	39	31	22	20	10	11	10	...	191	34·56	3·33
11	Diphtheria and Croup	91	65	14	5	2	...	1	...	...	...	...	...	...	...	...	...	...	178	32·21	3·10
12	Whooping Croup	161	4	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	167	30·22	2·91
13	Old Age	...	...	...	...	...	...	...	...	..	...	...	..	...	15	21	113	...	149	26·96	2·59
14	Apoplexy	1	...	1	1	3	1	7	12	14	18	14	15	20	17	7	13	...	144	26·06	2·51
15	Childbirth	...	...	1	3	26	33	26	27	17	4	...	..	...	...	...	...	...	137	24·76	2·39
16	Typhoid Fever	9	11	12	21	17	12	10	7	8	2	3	4	...	1	...	...	1	118	21·35	2·06
17	Brain Disease, &c.	20	6	2	8	5	1	...	6	12	9	7	9	6	5	3	3	...	102	18·46	1·78
18	Paralysis	2	...	...	1	1	3	1	6	9	8	7	3	14	18	11	13	...	97	17·55	1·69
19	Enteritis	65	6	4	...	2	1	3	1	...	1	1	2	...	1	...	2	1	90	16·29	1·57
20	Cephalitis	34	16	6	7	4	5	1	...	3	2	2	2	...	...	...	...	1	82	14·84	1·43
21	Lung Disease, &c.	28	3	3	3	...	2	4	5	2	5	7	2	3	1	2	3	...	73	13·21	1·27
22	Teething	72	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	72	13·03	1·25
23	Stomach Disease and Gastritis ...	29	1	1	..	...	1	4	...	6	8	...	2	2	1	3	7	...	65	11·76	1·13
24	Tabes Mesenterica	61	1	...	1	...	...	1	..	...	...	...	...	...	...	...	..	...	64	11·58	1·11
25	Liver Disease	...	...	1	1	2	...	7	4	6	8	10	10	6	6	...	1	...	62	11·22	1·08
26	Suicides	...	...	1	...	2	6	5	7	9	7	9	4	4	3	..	...	...	57	10·31	·99
27	Other Tuberculous Diseases ...	30	9	3	6	...	2	1	3	...	3	..	...	...	...	...	...	...	57	10·31	·99
28	Tuberculosis and Scrofula	20	1	6	4	5	4	2	3	...	1	2	1	...	...	...	1	...	50	9·05	·87
29	Hydrocephalus	44	4	1	...	...	...	..	...	...	..	...	...	...	..	...	...	...	49	8·87	·85
30	Rheumatism	1	5	5	8	4	2	5	2	2	1	...	4	1	...	1	6	...	47	8·50	·82
31	Bright's Disease	...	2	3	1	2	4	4	2	1	6	7	4	4	4	..	3	..	47	8·50	·82
32	Alcoholism	...	...	...	2	...	1	...	4	11	7	5	5	1	1	1	...	...	38	6·88	·66
33	Nephritis	3	4	3	..	2	3	4	1	5	2	5	2	...	1	1	2	...	38	6·88	·66
34	Kidney Disease, &c	...	...	...	...	1	2	6	1	1	2	11	...	4	4	4	...	...	36	6·51	·63
35	Erysipelas	14	1	1	1	...	1	1	2	2	1	3	1	3	3	1	1	...	36	6·51	·63
36	Dropsy	5	1	2	...	2	...	2	1	3	2	2	2	3	3	4	3	...	35	6·33	·61
37	Pleurisy	2	1	2	4	2	1	3	1	7	2	1	3	3	1	...	...	...	33	5·97	·57
38	Epilepsy	2	3	3	5	2	4	2	4	2	2	1	...	...	...	...	2	...	32	5·79	·56
39	Measles	27	3	1	...	...	...	...	...	...	...	...	...	...	...	...	..	...	31	5·61	·54
40	Ileus	6	3	1	...	1	2	3	...	3	1	2	2	...	2	1	3	...	30	5·43	·52
	Total	2007	217	140	180	211	229	232	260	275	280	268	207	155	187	119	244	10	5221	944·82	90·96

Return of Deaths from the Forty most Prevalent Causes in the Colony of New Zealand during the year 1885. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.
1	Phthisis	14	4	12	57	82	94	71	38	40	37	29	21	9	3	2	1	..	514	89·65	8·45
2	Accidents	85	28	25	28	24	37	30	37	43	36	28	15	14	10	4	7	3	454	79·18	7·46
3	Disease of Circulatory System	18	9	9	12	9	16	17	19	34	51	45	40	47	36	26	21	..	409	71·33	6·72
4	Diarrhœa and Dysentery	337	2	2	4	6	1	7	1	1	3	5	4	4	1	1	6	..	385	67·15	6·33
5	Pneumonia	106	10	5	14	10	18	18	16	18	18	18	13	12	10	7	4	..	297	51·80	4·88
6	Atrophy, Debility, and Inanition	268	2	..	..	1	..	1	2	1	2	2	3	11	1	..	..	..	294	51·28	4·83
7	Bronchitis	168	4	5	1	..	1	2	2	4	4	8	9	11	15	16	22	..	272	47·44	4·47
8	Premature Birth	229	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	229	39·94	3·76
9	Cancer	..	..	..	..	..	2	6	5	20	36	28	18	23	22	9	8	..	177	30·87	2·91
10	Diphtheria and Croup	82	66	18	4	1	..	..	..	..	..	..	..	1	..	..	..	..	172	29·99	2·83
11	Old Age	..	..	..	..	..	..	..	..	..	..	..	..	..	14	33	122	..	169	29·47	2·78
12	Convulsions	153	3	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	157	27·38	2·58
13	Childbirth	..	..	..	5	26	31	27	27	23	5	..	..	..	..	..	..	..	144	25·11	2·37
14	Enteritis	99	5	5	6	5	..	6	..	4	3	2	3	2	3	..	..	..	143	24·94	2·35
15	Apoplexy	4	..	2	..	3	2	6	6	5	20	17	10	18	23	9	12	..	137	23·89	2·25
16	Typhoid Fever, &c.	13	18	14	16	22	12	10	10	4	5	2	2	..	..	..	..	..	128	22·32	2·10
17	Paralysis, &c.	1	2	1	1	3	2	5	3	10	5	13	10	8	17	14	24	..	119	20·75	1·96
18	Liver Disease, &c.	18	2	1	..	3	6	1	8	10	15	16	12	13	9	2	2	..	118	20·58	1·94
19	Inflammation of the Brain	42	11	7	16	8	6	6	5	2	3	3	2	1	1	..	..	..	113	19·71	1·86
20	Teething	101	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	101	17·61	1·66
21	Whooping Cough	87	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	91	15·87	1·50
22	Brain Disease, &c.	38	3	2	..	2	7	2	6	3	4	2	2	8	3	3	3	..	88	15·35	1·45
23	Diseases of Stomach and Gastritis	43	..	..	1	1	..	2	2	5	4	2	2	5	6	4	2	..	79	13·78	1·30
24	Hydrocephalus	46	12	7	3	1	3	..	..	..	..	..	..	..	..	..	..	..	72	12·56	1·18
25	Other Diseases of Respiratory System	28	1	..	..	1	1	1	3	8	3	3	2	2	5	4	3	..	65	11·34	1·07
26	Tabes Mesenterica	51	5	2	3	1	..	..	..	..	..	..	..	..	..	..	..	..	62	10·81	1·02
27	Suicides	..	..	1	2	5	7	5	8	5	6	5	1	4	3	2	..	..	54	9·42	·89
28	Bright's Disease	..	2	1	2	2	3	4	3	10	9	3	4	5	3	..	2	..	53	9·24	·87
29	Scrofula	18	5	4	4	2	6	1	2	2	1	2	1	..	..	..	..	..	48	8·37	·79
30	Peritonitis	5	5	2	3	3	7	3	1	..	4	1	2	2	1	..	3	..	42	7·32	·69
31	Erysipelas	13	..	1	..	2	2	2	..	5	2	5	1	5	1	1	1	..	41	7·15	·67
32	Epilepsy	4	1	6	4	4	..	2	4	3	2	4	..	4	..	..	..	..	38	6·63	·62
33	Ileus	9	1	..	1	1	1	2	..	2	2	1	1	3	6	3	..	..	33	5·75	·54
34	Pleurisy	3	1	..	3	3	1	6	2	4	2	1	2	1	1	..	3	..	33	5·75	·54
35	Rheumatic Fever	2	4	4	8	5	2	3	..	..	..	..	..	2	..	..	2	..	32	5·58	·53
36	Alcoholism	..	..	..	..	2	5	5	4	4	3	6	2	..	..	..	..	..	31	5·41	·51
37	Insanity	..	1	..	2	..	2	7	6	4	4	2	1	1	..	1	..	..	31	5·41	·51
38	Want of Breast Milk	29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	29	5·06	·48
39	Other Diseases of Urinary System	..	3	..	1	..	4	2	..	2	2	5	3	3	..	2	1	..	28	4·88	·46
40	Laryngitis	11	9	1	..	..	..	1	..	..	..	..	..	1	1	..	..	..	24	4·18	·39

showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.
1	Phthisis	12	8	16	44	81	70	57	54	57	34	31	14	8	11	2	1	..	500	85·89	8·15
2	Accidents	85	47	35	29	25	35	45	34	41	37	37	15	12	7	5	9	2	500	85·89	8·15
3	Diarrhœa and Dysentery	398	2	..	1	..	2	5	1	3	3	4	1	6	4	1	4	..	435	74·73	7·09
4	Disease of Circulatory System ..	14	10	13	15	11	15	13	25	30	46	41	42	50	31	26	25	..	407	69·92	6·63
5	Atrophy, Debility, and Inanition ..	293	2	..	1	1	..	2	2	2	2	3	4	6	..	..	..	..	318	54·63	5·18
6	Pneumonia	121	11	8	5	9	20	16	19	11	15	19	21	14	8	3	6	..	306	52·57	4·99
7	Bronchitis	189	5	1	1	..	..	4	5	2	2	7	9	11	12	11	29	..	288	49·47	4·69
8	Cancer	2	1	..	2	1	3	6	8	18	31	42	30	27	17	14	12	..	214	36·76	3·49
9	Old Age	.	..	..	..	..	..	..	..	..	..	..	..	..	17	47	143	..	207	35·56	3·37
10	Premature Birth	182	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	182	31·26	2·97
11	Convulsions	172	3	1	.	..	..	..	..	..	.	..	1	..	..	..	..	..	177	30·41	2·88
12	Diphtheria and Croup . ..	72	62	10	5	..	.	..	..	..	..	..	..	..	..	1	..	..	150	25·77	2·44
13	Typhoid Fever, &c.	16	15	8	20	24	15	6	10	6	6	4	..	1	1	1	1	..	134	23·02	2·18
14	Whooping Cough	130	2	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	132	22·67	2·15
15	Apoplexy	1	..	..	..	4	6	3	7	12	12	12	10	19	17	12	14	..	129	22·16	2·10
16	Enteritis	95	2	2	4	2	1	1	1	2	3	6	..	3	1	1	2	.	126	21·64	2·05
17	Liver Disease, &c.	23	3	2	2	5	4	4	2	10	11	8	11	11	17	5	5	..	123	21·13	2·00
18	Teething	115	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	115	19·75	1·87
19	Paralysis, &c.	2	..	2	2	2	3	3	8	7	10	7	13	14	12	13	15	..	113	19·41	1·84
20	Childbirth, &c.	..	..	..	5	20	27	27	21	9	2	..	..	.	..	..	..	..	111	19·07	1·81
21	Inflammation of the Brain	50	15	9	11	9	4	4	2	..	..	..	1	1	..	..	1	..	107	18·83	1·74
22	Hydrocephalus	45	15	7	6	8	1	..	..	..	..	..	..	..	..	..	..	..	82	14·09	1·34
23	Brain Disease, &c.	23	6	5	7	3	2	3	2	3	2	4	2	..	2	4	4	..	72	12·37	1·17
24	Other Diseases of Respiratory System	28	2	1	1	1	5	3	3	2	5	8	1	3	5	1	3	..	72	12·37	1·17
25	Tabes Mesenterica	63	3	2	1	2	..	..	..	..		..	..	..	..	.	..	..	71	12·20	1·16
26	Suicides	..	..	..	5	2	9	10	7	6	13	7	4	3	..	..	..	..	66	11·34	1·07
27	Diseases of Stomach and Gastritis	27	..	2	2	..	2	3	..	1	4	4	5	3	3	3	3	..	62	10·65	1·01
28	Bright's Disease	..	..	3	..	5	6	6	3	7	5	4	8	4	4	1	1	..	57	9·10	·93
29	Scrofula	18	5	3	5	10	1	1	2	3	1	2	..	1	..	..	..	..	52	8·93	·85
30	Measles	40	6	1	..	..	1	1	..	..	..	..	..	..	..	..	..	..	49	8·42	·80
31	Peritonitis	7	2	5	5	3	3	2	4	2	1	2	1	..	2	..	2	..	41	7·04	·67
32	Alcoholism	..	..	..	..	2	..	2	7	2	7	8	4	1	2	1	..	..	36	6·18	·59
33	Want of Breast Milk	33	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	33	5·67	·54
34	Ileus	6	1	1	2	1	2	1	1	1	.	3	3	..	..	4	4	..	30	5·15	·49
35	Epilepsy	4	2	4	4	2	2	1	5	1	..	2	..	1	1	1	..	..	30	5·15	·49
36	Thrush	24	..	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	24	4·12	·39
37	Erysipelas	7	1	1	..	1	1	..	..	..	2	1	2	1	1	..	3	..	21	3·61	·34
38	Simple Cholera	18	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	20	3·43	·32
39	Emphysema Asthma	..	..	..	..	..	..	2	..	..	4	1	3	1	3	3	3	..	20	3·43	·32
40	Pleurisy	..	1	2	2	..	1	..	2	1	1	2	2	1	2	2	1	..	20	3·43	·32
	Total	2315	232	144	187	234	241	231	235	240	259	270	207	202	180	162	291	2	5632	967·50	91·80

Return of Deaths from the Forty Most Prevalent Causes in the Colony of Tasmania during the year 1884. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000.	Whole Colony. Percentage to Deaths from all Causes.
1	Old Age ..	..	..	..	..	..	..	..	..	..	..	.	..	10	30	65	197	..	302	231·34	15·17
2	Diseases of Circulatory System	1	2	2	4	5	5	4	5	11	7	14	12	22	21	14	22	..	151	115·67	7·59
3	Phthisis ..	4	1	2	16	19	25	17	10	16	7	14	3	6	1	1	3	..	145	111·08	7·29
4	Atrophy and Debility	112	2	1	..	..	1	1	1	2	..	2	2	..	1	..	1	..	126	96·52	6·33
5	Convulsions ..	114	1	.	..	..	..	..	..	..	..	..	..	..		..	.	..	115	88·09	5·78
6	Bronchitis ..	43	2	1	1	1	..	1	..	..	1	1	5	7	5	12	12	..	92	70·47	4·62
7	Accidents ..	17	3	2	5	8	9	2	3	1	4	5	7	5	4	3	2	..	80	61·28	4·02
8	Pneumonia ..	25	1	1	5	2	7	1	2	1	5	2	4	5	6	3	4	..	74	56·69	3·72
9	Cancer ..	.	..	..	1	..	..	1	1	2	5	11	5	13	6	11	9	..	65	49·79	3·27
10	Brain Disease, &c. ..	18	..	1	3	3	1	1	3	2	1	..	6	7	10	1	4	..	61	46·73	3·06
11	Diarrhœa and Dysentery	53	..	..	..	..	..	..	..	1	..	1	1	..	..	..	1	.	57	43 66	2·86
12	Apoplexy ..	1	..	..	..	..	2	1	..	..	3	7	9	7	10	8	6	.	54	41 37	2·71
13	Typhoid Fever, &c. ..	5	8	2	9	7	8	2	4	1	1	..	..	1	1	..	1	..	50	38 30	2·51
14	Croup and Diphtheria	32	13	2	3	..	..	..	1	..	..	..	..	..	..	..	..	..	51	39 06	2·56
15	Cephalitis ..	12	6	6	3	2	2	2	..	2	2	1	1	1	1	..	..	..	41	31·41	2·06
16	Paralysis ..	..	1	..	..	..	..	..	..	..	1	4	3	6	4	7	14	..	40	30·64	2·01
17	Dropsy ..	1	1	..	1	..	..	2	2	1	..	1	1	6	4	6	7	..	33	25·28	1·66
18	Premature Birth	31	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	31	23·75	1·56
19	Congestion of the Lungs	17	..	1	2	..	1	..	..	1	1	..	1	2	1	..	1	..	28	21·45	1·41
20	Teething ..	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28	21·45	1·41
21	Liver Disease ..	1	..	..	1	3	..	1	1	4	1	4	3	3	..	2	3	..	27	20·68	1·36
22	Enteritis	11	..	..	..	1	1	.	..	2	..	..	1	3	1	2	..	..	22	16·85	1·10
23	Nephria .	..	..	..	..	..	1	2	2	2	1	2	..	2	2	..	2	..	16	12·26	·80
24	Gastritis and Stomach Disease	1	..	..	..	1	..	1	.	1	2	..	1	3	1	4	..	..	15	11·49	·75
25	Privation ..	5	2	..	1	1	..	..	..	1	..	..	1	.	..	2	1	..	14	10·72	·70
26	Pleurisy ..	1	1	..	1	..	1	..	1	1	1	1	2	..	..	2	1	..	13	9·96	·65
27	Scarlatina ..	7	4	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	12	9·19	·60
28	Kidney Disease, &c. ..	..	..	1	..	1	..	..	1	..	..	1	2	1	1	2	2	..	12	9 19	·60
29	Childbirth and Metria	..	..	..	2	..	4	4	1	1	..	..	..	..	..	..	..	..	12	9·19	·60
30	Whooping Cough ..	11	..	..	..	..	..	..	..	..	..	..	..	..		..	..	..	11	8·43	·55
31	Peritonitis ..	..	..	1	1	2	..	2	1	1	..	1	..	1	1	..	..	..	11	8·43	·55
32	Rheumatism ..	..	..	1	..	1	..	..	1	4	1	..	..	..	1	..	1	..	10	7·66	·50
33	Asthma ..	..	..	..	..	..	1	..	..	1	1	..	1	5	..	..	..	..	9	6·89	·46
34	Hydrocephalus	6	..	..	..	..	1	..	..	..	.	1	..	..	.	..	..	..	8	6·13	·40
35	Hepatitis ..	1	..	..	..	..	..	..	..	2	1	1	1	..	1	1	..	..	8	6·13	·40
36	Erysipelas ..	4	1	..	..	1	..	..	..	..	1	..	..	1	.	..	..	..	8	6·13	·40
37	Jaundice, Gallstone, &c.	4	..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..	7	5 36	·35
38	Alcoholism ..	..	..	..	..	..	..	1	..	1	1	2	1	..	..	1	..	..	7	5·36	·35
39	Thrush ..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	4·60	·30
40	Hydatid	1	..	..	..	..	1	..	..	1	..	..	2	1	..	..	..	..	6	4·60	·30

… arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000	Whole Colony. Percentage to Deaths from all Causes.
1	Old Age ..	..	..	..	..	..	..	..	..	..	..	..	..	10	33	63	209	..	315	235·44	15·47
2	Phthisis ..	11	..	4	11	18	28	20	4	8	9	13	5	3	5	3	3	..	145	108·38	7·12
3	Diseases of Circulatory System	5	..	5	4	5	3	3	3	9	9	7	10	21	19	19	23	..	145	108·38	7·12
4	Convulsions	141	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	145	108·38	7·12
5	Atrophy and Debility	107	..	..	1	1	..	..	..	..	3	2	6	1	..	2	1	..	124	92·68	6·09
6	Diarrhœa and Dysentery	94	1	..	1	..	..	2	..	..	1	..	1	2	2	2	4	..	110	82·22	5·40
7	Bronchitis	48	4	1	..	1	..	..	..	1	1	1	4	7	11	4	12	..	95	71·00	4·67
8	Accidents	21	6	9	6	5	5	4	1	2	2	2	4	4	6	5	3	..	85	63·53	4·17
9	Pneumonia	16	..	..	2	5	2	1	1	2	2	5	6	11	5	1	3	..	62	46·34	3·04
10	Cancer ..	..	..	..	..	1	1	1	3	..	3	7	6	12	13	5	8	..	60	44·85	2·95
11	Apoplexy	1	..	..	..	1	..	..	1	3	4	3	4	14	9	5	9	..	54	40·36	2·65
12	Paralysis	..	..	..	2	..	1	..	..	..	3	3	6	7	10	9	12	..	53	39·61	2·60
13	Croup and Diphtheria	28	18	..	3	..	..	..	..	..	..	..	..	1	..	..	..	..	50	37·37	2·45
14	Brain Disease, &c.	15	3	.	1	2	1	3	1	..	2	1	4	5	6	3	2	..	49	36·62	2·41
15	Congestion of the Lungs	23	2	1	..	2	1	..	..	..	1	1	1	3	1	1	2	..	39	29·15	1·91
16	Teething	35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35	26·16	1·71
17	Cephalitis	16	3	1	5	..	3	1	..	..	1	1	1	2	..	..	..	..	34	25·41	1·67
18	Typhoid Fever, &c.	3	2	5	4	5	6	2	..	..	..	..	..	2	1	..	..	..	30	22·42	1·47
19	Dropsy ..	3	..	..	..	..	1	1	1	.	2	1	2	2	4	4	8	..	29	21·67	1·42
20	Privation	15	..	..	1	1	..	2	1	1	1	..	..	..	1	..	2	..	25	18·69	1·23
21	Premature Birth	25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	18·69	1·23
22	Measles ..	15	1	..	3	..	..	1	..	..	..	..	..	..	..	..	..	..	20	14·95	·98
23	Enteritis	11	..	..	..	1	..	..	1	..	1	..	1	2	1	..	1	..	19	14·18	·93
24	Liver Disease, &c.	..	..	..	..	..	3	..	..	2	1	2	2	1	4	3	1	..	19	14·18	·93
25	Whooping Cough	16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	11·96	·78
26	Childbirth and Metria	..	..	..	1	6	4	1	1	1	2	..	..	..	..	..	..	..	16	11·96	·78
27	Kidney Disease, &c. ..	..	..	..	1	..	1	1	..	..	2	2	1	..	..	..	3	..	11	8·22	·54
28	Hydrocephalus	9	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	11	8·22	·54
29	Hepatitis	1	..	..	..	..	1	1	.	..	1	1	..	..	4	1	..	..	10	7·47	·49
30	Asthma ..	3	..	..	..	..	..	..	..	1	..	..	..	2	2	1	1	..	10	7·47	·49
31	Gastritis and Stomach Disease	1	..	..	..	1	..	..	..	..	1	2	..	1	2	2	..	..	10	7·47	·49
32	Lung Disease, &c.	1	..	..	..	1	..	1	..	1	1	..	1	2	..	1	..	..	9	6·73	·44
33	Nephria ..	..	..	..	2	2	1	..	..	..	1	..	..	2	1	..	..	..	9	6·73	·44
34	Cystitis ..	..	..	..	..	..	..	..	..	..	..	1	..	..	4	..	4	..	9	6·73	·44
35	Jaundice, Gallstone, &c.	5	..	..	..	..	..	..	..	1	..	..	..	1	..	1	1	..	9	6·73	·44
36	Thrush ..	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	6·73	·44
37	Pyæmia	3	..	..	..	1	1	1	..	..	..	..	..	1	1	..	1	..	9	6·73	·44
38	Influenza, &c. ..	3	..	..	..	..	..	..	..	..	..	..	1	..	1	..	3	..	8	5·98	·39
39	Peritonitis	1	..	..	..	..	2	..	1	..	1	..	..	..	1	1	..	..	7	5·23	·34
40	Pleurisy	1	1	..	..	..	..	..	1	..	1	..	..	..	2	.	..	..	6	4·48	·29
	Total	686	42	26	49	59	66	46	20	33	56	55	66	120	150	136	316	..	1926	1439·56	94·60

*Return of Deaths from the Forty most Prevalent Causes in the Colony of Tasmania during the year 1886. Arranged in the order of fatality, showing the number of deaths from each cause occurring in each Quinquennial Period of Life, the **Death-rate** per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.*

Order of Fatality.	Cause of Death.	Under 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 years upwards.	Ages not specified.	Whole Colony. Total Deaths.	Whole Colony. Rate per 100,000	Whole Colony. Percentage to Deaths from all Causes.
1	Old Age	...	...	...	...	...	...	...	...	...	...	...	...	11	22	59	195	...	287	211·81	14·52
2	Diseases of Circulatory System	6	3	3	3	7	4	5	6	4	4	13	13	17	27	22	10	1	148	109·22	7·49
3	Phthisis	4	2	...	15	31	23	22	11	5	8	5	7	3	4	2	4	...	146	107·45	7·39
4	Convulsions	121	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	123	90·77	6·22
5	Atrophy and Debility	106	..	...	...	1	2	...	...	...	...	4	...	2	...	...	..	...	115	84·87	5·81
6	Bronchitis	41	3	...	2	...	1	...	1	2	1	1	3	6	16	12	14	...	103	76·01	5·21
7	Diarrhœa and Dysentery	82	1	1	1	1	1	1	1	...	2	2	2	1	1	4	2	...	103	76·01	5·21
8	Accidents	17	5	6	11	7	1	8	1	3	5	2	4	6	3	3	7	...	89	65·68	4·50
9	Pneumonia	28	5	...	2	...	2	5	1	2	5	5	1	6	8	3	2	...	75	55·35	3·79
10	Cancer	...	...	...	...	...	...	1	2	2	3	3	10	9	9	9	9	...	57	42·07	2·88
11	Apoplexy	...	1	...	...	...	1	1	..	...	3	10	3	3	12	10	11	...	55	41·59	2·78
12	Typhoid Fever	...	2	2	8	11	11	3	3	2	1	2	1	...	1	...	...	...	47	34·69	2·38
13	Brain Disease	14	1	1	1	4	1	1	4	...	1	2	2	2	10	2	...	...	46	33·94	2·33
14	Congestion of Lungs	19	2	...	1	3	2	...	1	...	...	3	3	1	1	1	6	...	43	31·73	2·18
15	Premature Birth	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	37	27·31	1·87
16	Paralysis	1	...	...	...	1	...	...	1	1	...	2	5	5	3	11	5	1	36	26·57	1·82
17	Croup and Diphtheria	20	11	...	2	1	...	...	...	...	...	..	...	...	...	...	...	...	34	25·09	1·72
18	Dropsy	2	1	...	1	1	...	2	2	1	3	2	2	1	4	3	7	...	32	23·62	1·62
19	Liver Disease	...	...	1	...	...	1	2	...	5	2	4	5	1	3	2	1	...	27	19·93	1·37
20	Whooping Cough	26	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	19·93	1·37
21	Privation	8	...	...	...	...	...	1	1	2	...	...	...	1	4	1	3	...	21	15·50	1·06
22	Enteritis	10	...	...	...	1	1	...	1	...	1	1	1	...	...	1	...	..	17	12·55	·86
23	Teething	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	16	11·81	·81
24	Nephria	...	...	...	...	2	1	1	2	...	2	2	1	...	3	1	1	...	16	11·81	·81
25	Asthma	1	...	...	1	...	...	1	2	1	1	...	2	2	1	2	..	...	14	10·33	·71
26	Childbirth and Metria	...	...	...	1	3	1	1	...	1	4	...	1	...	...	...	...	...	12	8·86	·61
27	Gastritis and Stomach Disease ...	5	..	...	1	1	2	...	...	...	...	...	1	1	...	...	...	...	11	8·12	·56
28	Tumor	...	...	...	...	...	1	1	1	1	4	1	...	1	...	...	...	...	10	7·38	·51
29	Lung Disease	1	1	...	...	1	...	...	...	...	1	...	2	...	2	...	1	...	9	6·64	·45
30	Peritonitis	1	...	...	2	...	3	...	...	1	...	...	...	...	2	...	...	...	9	6·64	·45
31	Ileus	4	...	...	1	...	...	1	...	...	...	...	1	..	...	...	2	...	9	6·64	·45
32	Hernia	1	...	...	...	...	...	...	...	...	...	2	...	2	...	2	1	...	8	5·90	·40
33	Want of Breast Milk	7	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	5·17	·35
34	Erysipelas	1	...	...	...	...	1	...	...	...	...	1	1	...	1	...	1	...	6	4·43	·30
35	Thrush	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	4·43	·30
36	Mortification	1	...	..	...	...	1	..	...	..	...	...	...	2	...	1	1	...	6	4·43	·30
37	Epilepsy	...	...	...	2	1	1	...	1	...	...	...	...	1	...	...	...	...	6	4·43	·30
38	Pleurisy	2	...	...	...	2	...	...	1	...	...	...	...	...	1	...	...	...	6	4·43	·30
39	Nephritis	...	..	...	...	1	...	...	...	1	...	1	...	1	...	2	...	...	6	4·43	·30
40	Rheumatism	...	...	1	...	1	1	...	1	...	...	...	1	...	...	...	..	...	5	3·69	·25
	Total	588	30	15	56	82	63	57	44	34	51	68	72	85	138	153	283	2	1830	1350·54	92·61

Return of Deaths from the Forty most Prevalent Causes in the Colony of Western Australia during the year 1886. Arranged in the order of fatality, showing the Death-rate per 100,000 of the mean population from each cause, and the percentage of deaths from each cause to the deaths from all causes.

Order of Fatality.	Cause of Death.	Whole Colony.		
		Total Deaths.	Rate per 100,000.	Percentage to Deaths from all Causes.
1	Accidents	67	169·26	8·31
2	Whooping Cough	61	154·10	7·57
3	Diseases of the Circulatory System ..	59	149·05	7·32
4	Old Age	56	141·47	6·94
5	Diarrhœa and Dysentery	53	133·89	6·57
6	Convulsions	48	121·26	5·95
7	Atrophy and Debility	47	118·73	5·83
8	Bronchitis	29	73·26	3·60
9	Pneumonia	29	73·26	3·60
10	Phthisis	27	68·21	3·35
11	Enteritis	19	47·99	2·36
12	Paralysis	17	42·95	2·11
13	Dropsy	16	40·42	1·98
14	Cancer	15	37·89	1·86
15	Premature Birth	14	35·37	1·74
16	Typhoid Fever	13	32·84	1·61
17	Influenza, &c.	13	32·84	1·61
18	Apoplexy	12	30·31	1·49
19	Liver Disease	12	30·31	1·49
20	Want of Breast Milk	9	22·74	1·12
21	Teething	9	22·74	1·12
22	Congestion of the Lungs	9	22·74	1·12
23	Diphtheria and Croup	9	22·74	1·12
24	Tabes Mesenterica	8	20·21	·99
25	Hydrocephalus	8	20·21	·99
26	Epilepsy	8	20·21	·99
27	Childbirth	7	17·18	·87
28	Brain Disease, &c.	6	15·16	·74
29	Remittent Fever	5	12·63	·62
30	Hepatitis	5	12·63	·62
31	Nephria	5	12·63	·62
32	Erysipelas	4	10·10	·50
33	Cephalitis	4	10·10	·50
34	Asthma	4	10·10	·50
35	Nephritis	4	10·10	·50
36	Kidney Disease	4	10·10	·50
37	Cyanosis	4	10·10	·50
38	Alcoholism	3	7·58	·37
39	Gastritis	3	7·58	·37
40	Laryngitis	3	7·58	·37
	Total	728	183·91	90·22

A RECORD OF THE PRESENT SANITARY STATE OF NEW SOUTH WALES.

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The idea of getting from each province of Australasia a statement as to its present sanitary condition, occurred to the Secretary of this Section, Dr. Springthorpe, and with wisdom equal to the happiness of his suggestion, he proposed no title for the several contributions. Accordingly, I have chosen a title for my own share; I call it "A Record of the Present Sanitary State of New South Wales." As to what, in my opinion, should be included under the phrase "sanitary state," that will appear from what follows; but as to the rest of the title, I beg of you to observe its wording, and to note that while I endeavour to record the facts as they stand to-day, I do not offer any comment upon them, nor any criticism. Nevertheless, the bare statement need not be put forth without a word to clothe it, although to none here, in all probability, is any such word necessary. We, denizens of new countries, know well what difficulties of ways and means are raised by the low rate of specific population which prevails everywhere, except over some comparatively small areas of our larger cities, and how often (for this among other reasons) even our advice has to be framed rather with regard to executive probabilities, than with legitimate aspirations in view. But the speculative sanitarian is little prone to give such considerations their due weight; and it, therefore, seems in place to remind him that if he sees shortcomings, we too are aware of them; if he sees reason to enjoin amendment, we labour for it.

Now, perhaps the best way of beginning a statement, of which perspicuity should be a characteristic, and which must yet consist mainly of detail, will be to give a few facts as to

Population and Area.

The area of the whole province is 310,700 square miles, and it is divided and sub-divided into electoral districts, counties, and municipalities. The total estimated population at the end of 1887 was 1,042,919, being in the proportion of three and one-third persons to the square mile, on the hypothesis of equal distribution. But the people are, in part, collected in cities, towns, and hamlets; and are generally referred to as living either in the metropolitan districts, or in the country. The metropolitan registration division has an area of about 256 square miles, and is estimated to carry thereon 350,866 persons, or 34 per cent. of the total population. But these are so distributed, that all but a small proportion live within one or other of the thirty-four municipalities which are comprised in the division, and which are referred to as the metropolitan districts, and these measure, altogether, about 111 square miles. They have an average density, therefore, of about five persons to the acre; but there is a great difference between the specific population of the several municipalities. One of

them, which has an area of twenty-seven acres only, has a density of 142; the city, of forty-six; others, of thirty-six and eleven; while one of the most recently incorporated, has about nine acres to each inhabitant. Sixty-six per cent. of the total population live in the country, or in country towns. In the Registrar-General's returns, the people living under these two distinct conditions are not distinguished, but are dealt with together under the one heading, "country districts." In order to get an idea of the proportions in which these are distributed between town and country, reference must be made to the last census returns. In 1881, about one-third of the total population lived in the metropolitan districts, about a fifth lived in country municipal districts, and about one-half lived under strictly rural conditions. Very possibly these proportions may not exactly apply to the present population, but they serve the purpose for which they are referred to well enough.

The next important point to be touched seems to be the kind of

Local Government

under which the people live. This is exclusively municipal. The more populous places are erected into municipalities, and these are divided into boroughs and municipal districts. The distinctions between these are based on population and area. A borough may not have a population of less than one thousand persons, nor an area of more than nine square miles; nor must any point be more than six miles in a straight line from any other; while the quantities mentioned in the case of municipal districts are five hundred persons, fifty square miles, and twenty linear miles. It will thus be seen that the terms "incorporated population" and "suburban population" are not synonymous.

The powers conferred on Municipal Councils are mainly in respect of water supply, sewerage, lighting, road-making and abatement of nuisances, not necessary to be particularly described in this place; but they are referred to again below in speaking of "Public Works" and "Sewerage." They may combine with adjacent districts, raise a general rate of 1s. in the £, and a farther rate or rates for the special purposes just mentioned to an amount not exceeding another 1s., and they may borrow money to an amount not exceeding the total estimated revenue for the next five years.

For the first fifteen years of incorporation, municipalities are subsidised by the central Government by quinquenially decreasing grants from the consolidated revenue.

A separate Statute called "The Nuisances Prevention Act," which may be proclaimed in any district, and in general is so proclaimed, although there are exceptions, relates mainly to the regulation of privies; but it also requires Councils to appoint Inspectors of Nuisances. These officers seldom possess any special education for their important duties, and, in any case, their usefulness is discounted by their being removable at the sole discretion of the Councils employing them. The only other officer whom it is necessary to refer to here, is the Surveyor, with whom Councils generally provide themselves. These do a great deal of valuable work; but, on the other hand, it is easy to point out instances in which the expenditure in their department has, for one reason or another, been wasteful, or even fruitless

The Corporation of Sydney has, of course, larger revenues and more important duties than others; it has also rather fuller powers. Especially, it may make by-laws for the inspection and prevention of the sale of unwholesome and adulterated food. It is required by the "Act of Incorporation" to appoint a city Officer of Health, and the latter is required to report monthly, and also to regard the occurrence of infectious diseases in the suburbs, so as to advise the Mayor as to the steps to be taken to prevent their entry to the city; and his other duties may be defined by by-law, though this has never been done. He is allowed private practice, and his salary is £250 a year.

Municipal Councils are subject to no superior authority, except in the case of the "Dairies Act," which they are the local authorities to administer, under supervision of the Board of Health. If the "Nuisances Prevention Act" be proclaimed within a district, and if the Council fail to execute it, the Government may suspend the latter, and administer their district; but this, manifestly, is a power which would be exercised only in case of extreme urgency.

A brief reference to the

LAWS TOUCHING THE PUBLIC HEALTH

must now be made; but, as there is no "Public Health Act," little can be said about them in an essay not devoted to an analysis of them. The more important are referred to under the special sections to which they belong. Here, I believe, it is only necessary to mention two of them—"The Adulteration" and "The Dairies Supervision" Acts.

The Corporation of Sydney has a special Act amending its Act of Incorporation, by which a penalty not exceeding £50 may be inflicted on any person selling, or exposing for sale within the city, any butter, meal, bread, or other article of food, knowing the same to be adulterated. There is also a general Act dated 1879, the authorities to execute which are constables authorised in that behalf upon occasions by the Inspector-General of Police, and clauses in several Acts relating to bread and flour, malt liquor, and to spirituous and fermented liquors. Under the general Act, successful proceedings have seldom, if ever, been taken. Upon the whole, analysis of foods and drugs is a matter that meets with little attention, except in connection with the Custom House; while analyses of water are undertaken mainly in connection with public works or institutions, "The Dairies Supervision Act," and sanitary investigations made by the Health Department. All of these it is the duty of the Government Analyst (who is an officer of the Medical Adviser to the Government) to perform. The "Dairies Supervision Act" came into operation at the beginning of 1887. Municipal Councils are the local authorities to administer it within their districts, police magistrates or senior officers of police outside municipalities, both being under the supervision of the Board of Health, to whom they are directly responsible. On becoming law, it applied to the metropolitan police district, and it has since been extended to the whole of the counties of Cumberland, Argyle, Camden, Northumberland, Gloucester and Durham. While it is far from containing all the provisions asked for by the officers of the Health Department, it nevertheless confers important powers. And, although the supervisory duties of the Board of Health in respect of it are seriously hampered,

by the absence of power to enforce by fine by-laws they may make under it, it has yet been the means of considerable improvement in dairy premises—more especially, perhaps, in the metropolitan districts, and in respect of water supply.

It will now be perceived that there is not, in New South Wales, any Health service such as in many other countries is properly indicated by that phrase. Nevertheless, the Government provides a

Health and Medical Department,

which performs for the whole country very many of those duties which, under a national organisation, are performed by local boards, under supervision of a central authority. This department includes a Chief and a Second Medical Officer, a Board of Health, a Secretary, the necessary clerical staff and offices, and certain establishments.

The Chief Medical Officer holds the posts of Health and Emigration Officer, and of Medical Adviser to the Government (and in the latter capacity he is, by the "Sale of Poisons Act," a member of the Board of Pharmacy, whose duty it is to register pharmacists who are duly qualified according to that act); he is allowed private practice. The Second Medical Officer holds the posts of Deputy Medical Adviser to the Government, Chief Medical Inspector of the Board of Health, and Examining Medical Officer to the Civil Service; he is the Executive Officer of the Department, and his whole time is devoted to his duties. The Health Officer is concerned with maritime quarantine alone, and he is an officer of the Treasury; he has a Boarding Medical Officer, who resides at the Boarding Station; a Health Officer for the port of Newcastle, and a Superintendent of Quarantine, with a staff; he has statutory powers under the "Quarantine Act and Amending Acts." The Medical Adviser is attached to the staff of the Chief Secretary, and he has general duties, which are advisory on matters referred to him by the Government. He has, also, special duties, which are:—supervision of the Coast Hospital; providing, controlling, and paying for hospital accommodation for the destitute sick from the vote for the maintenance of sick paupers; payment from the medical vote of claims for medical services rendered to coroners, courts of petty sessions, the police, salaries of gaol visiting surgeons, other salaries, and fees for public vaccination; supervision of Government medical officers, and payment of claims for all medical services rendered to the Government, by special direction. He has two special Government Medical Officers for the districts of Sydney and Parramatta, whose whole time is devoted to their duties; two medical officers at the Coast Hospital, and an analyst. He has no statutory powers.

The Board of Health

is under the Treasurer. It was created in 1881 by the "Infectious Diseases Supervision Act," to carry out, subject to any orders and to any general regulations made by the Executive Council, the powers of isolation conferred on the Health Officer by Section 2 of the principal Quarantine Act, and to define or extend the boundaries of any districts then or thereafter placed under charge of a Government medical officer. Under the Section mentioned, the restrictions of maritime quarantine are applied by the Board to members of the shore population and their

houses, when they are infected with small pox. By the Act of Appointment, the Board is to consist of not less than six members, and these are appointed by the Executive. In practice, there have always been four official members, namely:—the Health Officer, the Under-Secretary for Finance and Trade, the Inspector-General of Police, and the Mayor of Sydney; and there are four unofficial members, of whom one is a layman, while other three are chosen from the ranks of the practising medical profession. Originally, the Board elected its own chairman; but later, the presidency was made a matter of appointment by the Executive. All, except the official members, receive a fee for their attendance at meetings, and the latter are summoned by the President as seems necessary. The Board has statutory powers, as mentioned above, and in 1886 became the authority to supervise the administration of the "Dairies Act," then passed. In addition, it advises on matters submitted to it by the Executive; and, in practice, the Health Officer refers to it matters connected with maritime quarantine. Its officers are a Chief Medical Inspector, a Secretary, an Inspector under the "Dairies Act," and a Veterinarian. There remain to be mentioned, in this connection, Government Medical Officers and Public Vaccinators; but the latter will be better dealt with under the special heading of Public Vaccination. Besides the two special officers already mentioned, whose whole time is devoted to their duties, there is a general class of Government Medical Officers distributed over the country. These are appointed by the Executive; they are in correspondence with the Medical Adviser, who issues instructions to them, desiring them to report any prevalent or epidemic sickness they may observe. But they are unpaid by salary; they are remunerated by fees for duties actually performed in connection with the police, with coroner's courts, and for any special service they may render, at request of the Medical Adviser; and, in virtue of their appointment, they have a right of preference for employment on such duties over other practitioners residing in the same district. The organisation thus described is supplemented by two establishments.

The Quarantine Station

is situated on the northern of the two promontories which form the entrance to Port Jackson. Six hundred and seventy acres are there enclosed by a fence which runs from the waters of the Harbour to the cliffs which face the ocean; and the rest of the boundary includes the water as far as one cable's length from the shore. The permanent staff consists of the Superintendent (who has statutory powers) and seven men, and it is expanded on occasions by temporary aid. Communication with the Health Department is kept up by telephone, and by telegraph whenever the yellow flag is flying. There is accommodation in wooden houses on stone foundations for about three hundred persons, in several enclosures, and this is extensible by erection of marquees, for which permanent platforms are provided. The hospital enclosure accommodates about sixty; and there is a hospital ship which, in two deck pavilions, carries thirty beds. Water is derived from the neutral ground—which consists of weathered sandstone and sandstone rock, carrying a short brushwood—and it is conducted by suitable races to a reservoir holding a million gallons, whence it is distributed to every

part of the establishment by gravitation. The laundry is supplied with steam from a forty horse-power boiler; the disinfector is a Fraser's hot-air apparatus, and these, with stores and offices, stand at a quay. For communication with ships or with the city, a steam-launch (specially fitted to carry the sick) is provided. Emigrant ships carrying six hundred passengers have been cleansed, disinfected, all clothing, &c., washed, and admitted to pratique within thirty-six hours. This establishment is under control of the Health Officer.

The Coast Hospital

is nine miles from the city by road, and stands on a reserve of five hundred acres, whose boundaries are so arranged as to include the watersheds of three small but constant creeks, which has a frontage to the Pacific of about a mile and a half, and whose soil consists of sand and sandstone rock, carrying a short brushwood. The buildings are of wood and iron, the wards being in separate pavilions of one story; water from the creeks mentioned is distributed by gravitation from elevated tanks, to which it is raised by windmills; drainage is provided for slop water only, which passes by outside yard gullies through glazed piping to the sea; and garbage is cast over a cliff, whence it disappears almost immediately. Pan closets are used; they are emptied once or twice a day as seems necessary, and the contents are buried three-quarters of a mile away in the sand overlying another promontory. The number of beds is two hundred and forty-seven; the nursing staff consists of a matron and twenty nurses; the Ambulance staff of four men, fourteen horses, and five vehicles. The patients are (1) the destitute sick (but see Hospital accommodation); (2) cases of typhoid fever from all classes (and about one-half of all the cases receiving hospital treatment in Sydney are dealt with here); (3) cases of the other infectious fevers admitted from all classes for the sake of isolating them (but see Infectious Diseases); (4) male lock cases to the number of twenty-six; (5) and, in an isolated building, lepers, of whom there are at present one Australian white, and ten Asiatics. This hospital is entirely supported by Government; and the cost per bed per annum is £42 14s. 1½d., plus the special expense of the ambulance service, which is £5 4s. 3½d. This establishment is under control of the Medical Adviser. The same officer carries out the arrangements for the performance of

Public Vaccination,

which is provided at the Government expense, but which is not compulsory. In Sydney there is one station, which is open one day a week. Fortnightly supplies of humanised lymph are received from England, and these are supplemented by local cultivations, but the number of applicants does not suffice to keep up arm-to-arm vaccination. In the country, medical men may be appointed public vaccinators for the districts in which they reside, and Government medical officers are always so appointed, as well as others. Applicants under ten years of age may be vaccinated free of cost, but this general regulation has been relaxed in time of epidemics (when there is always a largely increased number of applications), and vaccinations at all ages, as well as re-vaccinations, have been then paid for—the fee is 2s. 6d. for each

successful vaccination of persons residing within five miles of the vaccinator's residence, 3s. 6d. beyond that distance. The English instructions to public vaccinators are issued. Reports are made quarterly; these furnish name, age, sex, and result only; there is no subsequent inspection of results.

I append two tables, which show for the metropolitan and country districts respectively, the births, the deaths under one and from one to five years, the number of successful public vaccinations under one and from one to five years, and the total number of successful public vaccinations at all ages, for each of the five years 1883-7 :—

Metropolitan Districts.

Year.	Births.	Deaths.		Vaccinations.		
		Under 1 Year.	1 to 5 Years.	Under 1 Year.	1 to 5 Years.	Total.
1883	10,290	1680	715	111	127	289
1884	11,872	2041	886	142	341	631
1885	12,266	2292	842	87	145	343
1886	13,132	2275	794	116	190	452
1887	13,415	1892	732	229	338	826

Country Districts.

Year.	Births.	Deaths.		Vaccinations.		
		Under 1 Year.	1 to 5 Years.	Under 1 Year.	1 to 5 Years.	Total.
1883	20,991	1910	999	153	269	593
1884	22,074	2244	993	1095	2682	6429
1885	22,777	2304	1174	322	693	1850
1886	23,152	2360	958	239	450	1301
1887	23,816	2042	865	261	1015	2187

A rough calculation shows that of 173,785 children whose births were registered in New South Wales during the five years 1883-7, about 140,000 (without allowance for emigration) remained alive and unvaccinated at the close of that period. This sum must be reduced by the numbers privately vaccinated, of which no record is kept; but the best enquiry I can make warrants the supposition that these are but few, and perhaps on the whole insignificant. The proportion of unvaccinated persons at all ages must be very large indeed.

I now pass on to certain special subjects, of which the first to be considered is

Public Water Supplies.

Eleven country towns, and the Hunter River district, which contains a large population in several adjacent towns, have public waterworks; while in three others, construction is at present going on. The water in all these cases is taken from streams, and in nine of them requires pumping; services are constant, and filtration is employed in only three instances. The maximum possible delivery of the works, taken together, is about fifteen million gallons per diem. Construction has usually

been undertaken by the Government, with moneys lent to the municipalities, on security of the works and rates, at 6 per cent.; this is devoted to payment of interest, and to reduction of capital account in the proportions of two-thirds and one-third respectively. In four cases, however, the work was undertaken by the Councils themselves, under approval of the Government. The total cost of finished works has been about £650,000; and on completion, they are handed over to the Municipal Councils, who are required merely to pay to the Government annually the sum due on the calculation mentioned above.

The supply of water for Sydney and the other metropolitan districts is taken from a catchment area of 354 square miles, which is situated about sixty miles away, and which includes the water-sheds of the Upper Nepean, the Cordeaux, and the Cataract rivers. Some small proportion of this area was alienated before there was thought of devoting it to this purpose; but it consists of sandstone rock mainly, and carries only a short brushwood, so that it is not cultivated, nor fit for any agricultural purpose. There are no inhabited dwellings on it. The waters of the rivers mentioned are impounded and united by very difficult works, and are led by tunnels, open canals, and pipe-aqueducts, for a distance of thirty-eight miles to Prospect. There, a reservoir has been formed, by throwing a dam across a grass-covered valley, of which the actual capacity is 10,812 million gallons, and the effective capacity 7110 million. Thence the flow passes by an open canal lined with diorite ashlar masonry, and five miles long, to Potts' Hill, where it enters a distributing reservoir of 100 million gallons capacity, through screening tanks; and thence it travels in pipes (which are to be duplicated) a farther distance of eleven miles to a reservoir at Crown Street, within the City of Sydney. The discharging capacity of the canal to Potts' Hill is 50 million gallons daily. This is a gravitation service, without filtration. The Prospect dam commands the whole of a very large extent of country, except a few uninhabited hill-tops; and thus it will be possible to supply from it several towns lying at reasonable distances from the pipe-line. So also, the Crown Street reservoir commands the greater part of the populous area to be served from it However, a proportion of the population, being that which lives in the districts of Waverley, Woollahra, and parts of Paddington near the centre, and the more distant and less thickly populated suburbs of Ashfield, Ryde, and North Shore, are, or will be, served from pumping stations situated at Crown Street and at Ryde respectively.

The following are two analyses, by the Government Analyst, of the metropolitan water, the first being taken before it enters the Prospect dam, the second from a city main:—

Date of Collection.	Description.	Grains per Gallon.		Parts per Million.				
		Total Solids.	Chlorine	Nitrogen as Nitrates & Nitrites.	Free Ammonia.	Albu-Ammonia.	Oxygen absorbed in 15 min at 80° F.	Oxygen absorbed in 4 hours at 80° F.
March 19, 1888 ..	From above the dam..	4·97	2·1	None	None	·06	·21	·22
Feb. 15, 1888 ..	From a city main ..	7·01	2·4	0·1	None	·1	·6	·92

At the end of 1888, about 75,000 houses were connected, and the average consumption per head was believed to be about forty gallons. The service is constant, meters being required only when the water is used for other than domestic purposes; and direct communication between water-closets, &c., and service pipes, is forbidden. In a large proportion of the houses which have for many years been served with water by an older and insufficient scheme however, the cisterns which were then necessary, have been retained; while in very many houses which stand outside the limits of the old scheme (as well as in others within those limits), the underground brick and cement tanks or surface wells formerly used, have not been filled up, although town water has been laid on to them. In the latter case, therefore, until a considerable time has elapsed (unless power should be given to compel the abolition of such sources, as soon as they are ascertained to yield polluted waters), the diminution in rates of mortality from typhoid and some other diseases which the new supply may reasonably be expected to effect, will not be fully realised (cf. Sewerage and Scavenage, *infra*).

The Sydney Water Supply is under control of the Metropolitan Water and Sewerage Board, constituted by the "Metropolitan Water and Sewerage Act," of 1880, but not appointed until the beginning of 1888, by an Amending Act; at present it deals with water alone. The cost of the works hitherto completed has been about £2,500,000, and the total cost will probably be more than £3,000,000. Charge is made by a rate which is 8d. in the £, struck on the ratable value of property as fixed for municipal purposes; and it is regulated by the annual sum necessary to pay interest on capital expenditure, to defray working expenses, and to provide for extensions.

Sewerage, Scavenage, &c.

Outside the Metropolition Division, there are no sewers. Within it, the City of Sydney (carrying an estimated population of 125,850 people in 22,385 houses, on an area of 4·29 square miles), has for many years been served by imperfect sewers constructed at different times, in various fashions, running in many instances on unrecorded and now forgotten lines, without ventilation, and discharging into the tidal waters of the Harbour. During recent years, all but 1538 of the houses have been fitted with water-closets, which in most cases are of antique patterns. The houses communicate with the sewers without disconnection; but fortunately, a large proportion have no sewer connection within their walls a usual arrangement being to place the closet in the yard, where also is a gully for slop-waters; baths often discharging on the yard surface, or above the gully.

Outside the City proper again, there are no sewers, except such as have quite recently been constructed; these are mentioned below. Slop-water is conducted from yard-gullies to street-gutters, which are often unformed; and if formed, are very often improperly graded. By these it is led, or sooner or later finds its way to the natural surface channels, which are thus converted into open sewers; and which discharge either into the Harbour, or into that extension of it which forms the mouth of the Parramatta River, or into Cook's River on the south.

Privies are either cess-pits, or pan-closets, the latter being often miscalled earth-closets. In most districts, these two forms are to be found side by side, for of late years there has been a very general endeavour to abolish the cess-pits which, not long ago, were almost universal. In a few districts, this effort has been completely successful; in others, the cess-pit still prevails. Pan-closets are emptied by contractors with the Municipal Councils once or twice a week, during the night, at a weekly charge of about 6d., which is paid by the landlord; but several districts are not effectually served, and in parts of them tenants are not prevented from burying the soil on their own premises, although that is contrary to a general by-law. The construction of cess-pits is under control of the Councils, and another by-law generally adopted requires that they shall be water-tight; but brick and cement are authorised materials to build them with, and although such work doubtless can be made water-tight, as a matter of fact, it very seldom is so. These also are emptied by the Councils, and the charge falls on the landlords; in consequence, emptying is often delayed too long.

Garbage is regularly removed from houses within the city and in some other districts, less regularly in remoter districts, and very irregularly, or even not at all, in country districts. Everywhere garbage is regarded apparently as a harmless material, and is put to improper uses; that is to say, for converting into building sites land otherwise useless for that purpose, for filling up hollows, and making good the surface of places of public resort, and for spreading over footways, and over arid surfaces in public parks, to promote the growth of herbage.

In 1880, a scheme of sewerage for parts of the metropolitan district was decided upon. It consists of a northern scheme designed to drain an area of eight and a half square miles, and to serve a prospective population thereon of 217,140 persons; and a southern, designed to drain an area of one and a half square miles, and to serve a prospective population of 50,500. It was arranged that the outfall and main intercepting sewers, as well as some of the more difficult parts of the subsidiary works, should be constructed by the Government; but branch sewers, house sewers, and connections are to be left to the Councils of the various municipalities to be served, who are to execute the work under Government supervision and regulations. At the end of 1887, the chief part of this design to be executed by the Government itself was completed; the northern outfall piercing a cliff, and discharging at a level four feet below high water mark into five fathoms or more of the constantly agitated waters of the Pacific, where they flow in an off-shore current; the southern discharging on a very large area of pure sand at Botany Bay, the average level of which is nine feet above high water mark, over which the crude sewage is distributed, and crops grown. The more difficult part of the subsidiary works to connect with the northern outfall, which involve tunnelling throughout their entire course, either through sandstone rock or through shale, are now approaching completion. These two outfall sewers, and the systems they serve, will relieve nearly the whole of the areas mentioned by gravitation; a fringe at the shores of the Harbour, which measures in the aggregate about 1000 acres (but which does not carry a pro-

portionately large population), will involve pumping. But that is but a small part of the metropolitan district which urgently requires sewering; and the rest of it is to be dealt with as follows:—A small scheme for the district of Manley, calculated to relieve an area of 482 acres, and a prospective population thereon of 18,316 persons (the present population being 3000), with an outfall to the ocean; and a scheme for North Shore, to serve an area of 888 acres, and a prospective population of 30,225 (the present population being 15,000, to discharge at a level of nineteen feet above high water mark into precipitating tanks, and a filtration area on the shores of Middle Harbour, are sanctioned, and are about to be begun. A third scheme, designed to sewer a suburban area of thirty-two square miles, and a prospective population thereon of 482,000 persons, at present carrying 164,000, is now under consideration of the Parliamentary Standing Committee on Public Works. This also is in the main a gravitation scheme, but about twenty-nine per cent. of the prospective flow will require pumping. To these sewers it is proposed to admit about fifteen per cent. of the rainfall only, or the proportion calculated to fall on back yards and back roofs; and the outfall will be at the sewage farm already mentioned, which at present is laid out for irrigation. So that while the general description with which this section began, at this moment holds good with regard to the metropolitan districts, carrying about 350,000 persons on 111 square miles taken as a whole; 125,000 persons, being the population of the city proper, are served by old and defective sewers, with which the houses are connected without precautions; about 150 houses are properly connected with the new northern outfall system, and about 1500 houses are properly connected with the new southern outfall system, while the remainder are unsewered, and are exposed to all those influences which promote a high death-rate from the filth diseases. Those influences, however, are naturally modified by the low rate of specific population which prevails over the greater part of the area.

The sum expended by the Government on main sewerage works to this date is £720,000, the sum authorised to be spent, either towards completion, or on the new schemes mentioned, is about £180,000, and the cost of the works now under consideration will doubtless amount to £1,500,000, the total being £2,400,000.

Before proceeding to describe the steps taken to prevent spread of the infectious diseases among the shore population, it is desirable to describe the

Practice of Maritime Quarantine.

This is conducted on the principles which, in the States, are referred to as Rational Quarantine. For my own part, I prefer to use the term Limited Quarantine, because, within certain limits, the ancient plan is followed. Ships which arrive infected with such diseases as measles or scarlet fever are not detained beyond the time necessary to remove the sick to isolation, and to cleanse the vessel. But in the case of some other diseases, as small-pox for example, all persons are detained for a period of twenty-one days, in separate classified enclosures, on shore, the vessel being held ready for release after disinfection.

The general rule thus indicated is subject to relaxation, and is best illustrated by the case of the U.S. Mail Steamer "Mariposa." A considerable proportion of her crew and passengers had been successfully vaccinated by the surgeon on board, and these were either released as soon as their effects had been dealt with, or were only detained until a period of fifteen days had elapsed since their successful re-vaccination.

But Quarantine is not imposed on vessels which arrive from other provinces of Australasia, when the latter happen to be infected. Communication is so rapid and frequent, that the infection of one province is taken to imply the infection of all. Nor against foreign vessels arriving from infected ports, China passenger ships alone excepted, and that merely on account of practical difficulties, which render any other course imprudent. In short, our practice is guided by the facts of infectious disease taken in conjunction with the circumstances in which we actually find ourselves placed.

Infectious Diseases.

Under the Statute, "An Act to Make Further Provision to Prevent the Spread of the Disease Known as Small-pox, and for Other Purposes" (See Board of Health—Infectious Diseases Supervision). On the appearance of any case of small-pox, or eruptive fever, which may reasonably be supposed to be small-pox, in any house or premises in New South Wales, the householder or occupier of the said house or premises, and also the medical practitioner attending the case, are directed to immediately report it in writing to the proper authorities. The penalty for neglect is a fine of not less than £10 nor more than £50, recoverable by distress; in default of sufficient distress, imprisonment, with or without hard labour, for any term not exceeding six months, may be inflicted.

For the purposes of the Act, those powers which are conferred on the Health Officer by the second Section of the Principal Quarantine Act, are transferred to the Board of Health, and the latter, on that authority, order the patient, the members of his household, any persons who may be discovered to have been recently in communication with the family, and the premises, to be isolated. Persons are usually isolated by removal to the Maritime Quarantine Station; but, when the number of cases is large (as happpened in 1881–2), or when the household infected is very large, and the premises they occupy are, by their position, sufficiently removed from neighbouring dwellings (as happened once in 1886), the houses are barricaded, and, with their occupants, placed under police sentries. In all cases, of course, premises are thus guarded until they have been disinfected, and are declared clean.

When an outbreak threatens, an ambulance camp is established in an isolated spot, and placed in connection with the Health Department by telephone; and patients, with their families, are removed in ambulances, which are driven by the staff residing there, in Quarantine, to one of the wharves. They are transferred thence to the Quarantine Station, in a launch specially fitted to carry the sick.

Suspicious cases are reported from time to time all the year round, but their number greatly increases as soon as it becomes known that

small-pox has made its appearance anywhere in Australasia. They are visited by the Chief Medical Inspector to the Board, who decides whether they are cases of small-pox or not, and who at once takes the necessary steps. He reports to the Board, who confirm the action taken, obtains special executive authority for it, and give any further directions which may seem necessary.

As the authority to administer "The Dairies Supervision Act," the Board has power to declare what are infectious diseases for the purposes of that Act. Cow-keepers, and also the medical attendant, must report any case of the diseases named, which they meet with on dairy premises, to the Board, in writing, under a penalty of £20. Prosecutions against medical practitioners have been instituted under the first-mentioned Act, and fines recovered from them, as well as, in one case, from an unqualified practitioner who had assumed the functions of medical attendant; but, as in other places where dual notification is the law, no prosecution has yet been undertaken against a lay householder, although in one instance, at all events, there seemed to be sufficient ground to proceed upon.

With exception, then (as to diseases) of small-pox, and (as to places) of dairy premises, infectious illness among the resident population is under no sort of supervision or restraint. No hospital regularly admits such cases, or cases of erysipelas, except the Coast Hospital (see Hospital Accommodation). There the Medical Adviser has improvised some accommodation for them, but the total number admitted was, in 1887, only 63. There is a Fraser's Disinfector at the Maritime Quarantine Station, and another at the Coast Hospital. Rarely requests for disinfection are received from the public. They are attended to without charge. (For prevalence of the zymotics, see Vital Statistics.)

The General Hospital Accommodation

for Sydney is furnished by 1003 beds, in six institutions; of these, one is strictly self-supporting, one is exclusively supported by the Government, while the remainder are supported by voluntary contributions in part, in part by payments made by the patients, in a further part by subsidies of public monies, and lastly, by payments from the Vote for the Maintenance of Sick Paupers, made at the rate of three shillings a head a day for every destitute patient admitted by direction of the Medical Adviser. There is also an institution, not included in the above, which is partly supported by voluntary contributions, and partly subsidised, called the Benevolent Asylum, where from 250 to 300 destitute women are received for lying-in annually. The 1003 beds are assigned as follows:—758 are for medical and surgical cases in adults; there are 44 lock-beds (10 female, 34 male); 70 for children, 26 for gynaecological cases, 75 ophthalmic, 22 for infectious fevers (other than typhoid); and there are 8 single bed wards. In the country, the last report of the Inspector of Public Charities (1886) shows that there are 1029 beds distributed among sixty-seven small hospitals, and the latter receive from the Consolidated Revenue either a grant in aid of their building fund, or else a subsidy equal in amount to the public subscriptions raised for building, and thereafter a subsidy equal in amount to the sums raised by public subscription to meet current

expenses. The inspection and passing of plans for new hospitals is a part of the duty of the Medical Adviser, preliminary to a subsidy being paid over.

I append a table, which shows some details of the Sydney hospitals, including revenue and expenditure, as far as these can be gathered from the annual reports for 1887. Admission to hospital is as follows:—The qualification for admission to the Coast Hospital for the majority, is destitution, this being a Government institution for the relief of the destitute sick, but cases of enteric and other infectious fevers are admitted from all classes for the sake of isolating them. To St. Vincent's, admission is free, and depends only on the suitability and urgency of the case, but capable patients contribute to their support. To Prince Alfred and Sydney Hospitals, a proportion are admitted free as being urgent cases; a majority either contribute something towards their cost, or are referred to the Medical Adviser for admission as being destitute, when he pays for their treatment at the rate of three shillings a day. The last mentioned class of patients, however, are expected to apply for admission to the Government Medical Officer for Sydney, who sits daily to give orders for their treatment at the hospital which may seem most suitable. In addition, a large number of chronic cases of illness among the destitute are lodged in the hospital wards of the Asylums for the Infirm and Destitute, which are situated (to the number of four, containing about 2000 inmates), in several situations outside the metropolitan division, and I have not thought it necessary to do more here than just mention the Lunatic Asylums. The proportion of strictly hospital beds to the estimated population of the metropolitan division is therefore 2·9 per 1000; and, as mentioned elsewhere, in 1887 about 15·7 of all deaths occurred in them.

HOSPITAL ACCOMMODATION. SYDNEY 1887.

Particulars omitted in this Table are not given in the published Annual Reports. Some others are not given, but are deduced in the manner explained by foot-notes.

Hospital.	Total No. of Beds.	Lock Beds. M.	Lock Beds. F.	No. of Cases Admitted.	Mortality.	Average Daily No. of In-Patients.	Average Stay, in Days.	Annual Cost per Bed. £ s. d.	No. of Out-Patients.	* Public Subscriptions and Donations. £ s. d.	Paying Patients. £ s. d.	Interest on Permanent Fund. £ s. d.	Other Sources of Income. £ s. d.	Government Subsidy. £ s. d.	Paid and Due from Government Pauper Sick Vote. £ s. d.	Total Revenue. £ s. d.	Total Expenditure. £ s. d.
Coast	247	24		1726	9·21	198·5	42·5	†42 14 1½	Nil.	Total expenditure paid by the Government					... ...	...	9512 5 2
Prince Alfred ..	224	No	ne	2056	9·16	197·0	28·6	‖85 11 0	22,770 att'd'ces	1868 2 9	3731 6 4	1500 0 0		3999 19 8	7062 15 0	18,162 3 9	‡16,041 7 7
Sydney	222	10	10	2512	10·03				11,719 patients	4486 18 3	369 9 0	1369 16 2	56 9 6	4000 0 0	1859 1 6	15,141 14 5	§14,503 6 2
St. Vincent's ..	200	No	ne	868	6·26				4691				51 12 11			3,615 4 11	3,551 19 0
Children's	¶39			258	9·36					1375 2 6	239 7 0		5 0 0	844 0 4		2,463 18 10	**2,184 10 0
Moorcliff, Orphan Branch of Sydney Hospital	63																
Benevolent Asylum	Between 250 and 300 destitute women are admitted into the Lying-In Ward annually.																

* Excludes Donations to Permanent Trust Fund or other Special Fund.

† Excludes cost of Special Ambulance Service, £5 4s. 3½d. per bed.

‡ Includes cost of Out-door Department, but excludes Expenditure on Funiture, Repairs, and Fire Insurance.

§ Includes cost of Out-door Department, but excludes Expenditure on Commission, Fire Insurance, Interest on Overdraft, and Building Repairs.

‖ This sum is calculated from the statement in the Report for 1887, that the average daily number of destitute patients who were paid for by Government, at the rate of 3s. per diem, was 129, and their cost to the Hospital £11,035 19s.

¶ Number of beds not given—39 patients were remaining in on 31st December, 1887.

** Excludes cost of collecting Subscription and sending small charges.

In connection with the present subject, it seems necessary to say something respecting the

Practice of Medicine,

since the manner in which this is conducted, under the existing laws, has a direct bearing on the value of the mortality returns. There is nothing to prevent unqualified practitioners from assuming titles likely to cause the public to believe that they are educated medical men; they must not, however, deceive the Medical Board (*infra*) into granting them a certificate that they are legally qualified practitioners, nor must they falsely advertise that they possess such a certificate. In 1886, the unqualified practitioners, not including prescribing druggists, but only faith-healers, herbalists, clairvoyants, electro-pathists, and all the like, were to legally qualified practitioners as one to three, in the whole province. But, by the "Medical Witnesses Act" of 1838, Coroners and Justices were empowered to summon legally qualified medical practitioners to give evidence at inquests, and to pay them certain fees; and by the Act to define the qualifications of medical witnesses at coroner's inquests, &c., of the same year, it was provided that no practitioner should be deemed legally qualified, who had not proved to the satisfaction of the Medical Board, to be appointed, that he possessed one or other of certain qualifications; and the Board, appointed by the same Act, to consist of not less than three members of the medical profession, was empowered to examine the papers of any person desiring to be declared legally qualified, and to issue to him a certificate. Further, by an Act to provide for the registration of legally qualified practitioners, passed in 1855, it was ordered that any person who shall prove to the satisfaction of the Board, that he has passed through a regular course of medical study of not less than three year's duration in a school of medicine, and that he has received, after due examination, from the University of Sydney, or from some other University, College or other body duly recognised for that purpose in the country to which such Universit,, &c., may belong, a degree, &c., entitling him to practise medicine in that country, shall be deemed to be a legally qualified practitioner within the meaning of the Acts first mentioned. This Board has no power to remove from the register any name once placed upon it, either in case of death, or for any other reason.

Speaking generally, medical men performing public duties are required to be registered in New South Wales; cases occur, however, in which Coroner's summon unqualified persons to give evidence even when legally qualified practitioners are accessible, and seek to pay the former the statutory fees. Some further remarks on this topic are made in the section on Vital Statistics.

The law which regulates the

Registration of Births and Deaths

was placed on the Statute Book in 1855; it has never been amended. Under it, parents (subject to interpretation) are required to give District Registrars information of births within sixty days; and thereafter, the registration of a birth (within the Colony) is not lawful, unless some person present at it, or the parent shall at some time within six months

next after it, make a solemn declaration regarding it. But in every case of the arrival of a child within the Colony under the age of eighteen months, born at sea, or in any place out of the Colony whose parents are about to take up their residence in the Colony, the birth may be registered on a solemn declaration being made by the parent. It is not lawful to register a birth within the Colony after the expiration of six month's, nor one without it after arrival of the child within it.

In case of a death, the tenant of the house or place where it occurred shall give the Registrar information within thirty days ; the Registrar must deliver to the undertaker or other person having charge of the funeral, a certificate of registration, and this must be delivered by the undertaker to the minister or officiating person who shall be required to bury, &c., the body ; and if any body shall be buried without that certificate, then the officiating person, who shall bury or otherwise dispose of it, shall forthwith give notice to the Registrar.

In the case of any new-born child or dead body found exposed—in the former case the Constable, in the latter the Coroner, shall give the information to the Registrar. Under Section 6, the Registrar-General may make regulations from time to time to be observed by the District Registrars (see Vital Statistics.)

I now approach the last section of this paper—that which deals with the

Vital Statistics.

of New South Wales. Although this subject naturally comes last, it is by far the most important. Just as one way of testing the degree of civilisation to which nations have attained, is to enquire into the value they set on human life, as witnessed by their laws. So, with some limitations, it may be learned by examining the form of their mortality returns, in what degree that legal or apparent value is based upon observation and reason, and in what it is merely imitative. I have, therefore, devoted a considerable space to describing the manner in which our returns are made. This is very much the same as in the other provinces, and, perhaps I need not detain you to hear read details, of which the value can only be arrived at after deliberate study. With your permission, therefore, I shall read only a few remarks on some of the more salient points ; first of all observing, that this matter is transacted quite independently of the Health Department, and that the returns are the outcome of the joint labours of the Registrar-General and Government Statist.

Registration Districts coincide throughout the country with electoral districts; but when the latter are very populous, or very large, they are divided into registration sub-districts. In the metropolitan division, sub-districts have, as far as possible, the same boundaries as municipalities; but, when thinly populated areas lie adjacent to municipalities, but outside them, such areas are sometimes included in the registration sub-district, of which the said municipality forms the main part.

As to *Street Names and Numbers* within the city of Sydney. The same name is not used more than once, and there are not many

unnumbered houses. The former statement holds good of the other metropolitan sub-districts, taken severally; but the same name is used over and over again in different districts. Houses in the more populous districts are imperfectly numbered, and in the less populous, are unnumbered as a rule. Long streets, which run through more than one district, are often numbered in part only. No map or index of streets and numbers within their districts are issued to the Registrars.

Still-births are unregistered, and it is well known that here, as in other countries, children who have lived even for several weeks have been buried as still-born.

The law as to the *Registration of Births* is defective, especially by allowing an interval of sixty days. It probably helps to swell the numbers who escape registration.

The "Registration Act" contains no mention of the *Cause of Death*. The Registrar-General has power under it to make regulations, which, when gazetted, have the force of the Act itself. In this way, the form of register has been prescribed, and one of its columns is headed "Name of the medical attendant by whom certified," and "When he last saw the deceased." The Registrars are therefore bound to enquire the name of the medical attendant, but are not bound to ascertain whether the name given is that of a legally qualified practitioner, although, no doubt, some of them do so.

In 1886, according to "Bruck's Medical Directory," there were in the whole province 526 legally qualified, and 183 unqualified, practitioners; 83 of the latter resided in Sydney.

Certified and Uncertified Deaths are not distinguished in the registers.

Deaths in Public Institutions are not distributed. In the country, there is no reason to suppose that they are in large proportion, and as districts are large, and Hospitals few, error could be caused by them only if abstracts for the larger towns were separately published, and this is not done; but the case is very different with the metropolitan district. There, in 1887, no less than 15·7 per cent. of all deaths occurred in public institutions.

Abstracts of the returns of Births and Deaths are published monthly for the metropolitan districts only, pursuant on a departmental order of the Registrar-General. Outside this area, abstracts are published annually only, and the larger towns are not separately reported on. The population which is dealt with in them, under the general heading "country districts," is in unknown proportions strictly urban and strictly rural (see sections 1 and 2).

I now give a detailed account of the important particulars furnished in the monthly abstracts for the Metropolitan districts, and in the annual abstracts for the whole province. The former are published to the current date, but the latter only to 1885.

The Monthly Abstracts for the Metropolitan District (or, the City and Suburbs of Sydney) then, give the following particulars and calculations (the estimated population at the middle of the current year is used):-
The absolute number of deaths under each of the eight classes, distinguishing those below five years of age, and the percentage of deaths

in each class to total deaths, are given for the city and for the suburbs separately. Under each class are mentioned the orders most largely represented by the observed causes of death ; and under each order are mentioned the more fatal diseases, number of the deaths due to each being given.

Another table enumerates the seven districts which form the metropolitan division, and the twenty-four sub-districts comprised in them ; it gives the estimated population of the several districts, and shows the number of births and deaths, distributed under sex, which occurred in the city district and in each of the sub-districts, and gives the percentage of deaths struck on the estimated population of each of the districts. Deaths in public institutions are here entered separately, and are not used in the calculation just mentioned ; they are included and used in the total for the metropolitan division.

A third table gives similar information for each of the eight wards of the city, but the population of each ward is not estimated.

A fourth table, intended for comparison, gives the number of births and deaths for the city and suburbs respectively, in the corresponding month of each of nine previous years and in the current month, and on these ten strikes an average. To this table the mean temperature and height of the barometer, and the rainfall in inches and on days, is added.

A fifth table gives the deaths under one year, under five years, and at all ages, in the corresponding month of each of five preceding years and in the current month, for the city and suburbs respectively.

These reports open with some general remarks. In the course of them, the percentage of deaths under five, to total deaths, and the monthly millesimal proportion of deaths to the living, are given.

The Annual Abstracts furnish in several tables the following information :—Table A, births and deaths in the whole province, distributed under sex, for each quarter of the current year. Table D, births in the whole province in each quarter of nine preceding years and of the current year, and the millesimal proportion of births to the population estimated at the middle of each year. Table G is constructed as Table D, but relates to deaths. Table H is entitled "Infantile Mortality ;" it gives the total deaths in the whole province, distinguishing those under five, and the percentage of the latter to the former, in each of nine previous and the current years. Table H*a* gives the deaths at all ages (1, 2, 3, 4. 5, and quinquennially up to 100) in the City of Sydney, in its suburbs, and in the country districts separately. Table H*b* contains the births, the deaths (distinguishing those under five), distributed under sex, in each ward of the city ; the enumerated population (1881) is added. Table H*c* is the same as H*b*, but for the whole city and for each sub-district in the metropolitan division ; the enumerated populations are added. Table I shows the centesimal proportion of deaths under five to total deaths, of deaths under five to births, of total deaths to births, and of total deaths to the enumerated population in each ward of the city during the current and each of the nine previous years. Table J, is constructed as Table I, but deals with the city as a whole, and each of the sub-districts of the metropolitan division. Table K gives the per-

centage of deaths under each of the classes and orders of the older classification, to the total deaths in the whole province in each of nine previous and the current years. Table L shows the births and deaths in Sydney and in the rest of the metropolitan division, the mean temperature and the mean height of the barometer, with the rainfall in depth and on days, for each month of the current year. In an appendix are shown the observed deaths from all causes, distributed under ages (1, 2, 3, 4, 5, and quinquennially up to 100), and set against classes and orders of males, of females, and of persons, which occurred during the year in Sydney, in the suburbs, in the country districts, and in the whole province during the year (twelve tables). Here there is also a summary table of deaths set against classes and orders of disease, for each month of the year, distributed under sex, and the percentage of deaths under each order to total deaths, for the whole province. Lastly, there is a table which shows the deaths that occurred in each ward of the city, set against classes and orders, distinguishing those under five; and to this is appended the total deaths set against classes and orders, which occurred in the city in the current and in each of nine previous years.

It only remains now to show from the abstracts I have just described, what the actual state of the public health was at the date of the last published returns. No life table has ever been constructed for New South Wales. I therefore give the two tables which follow, and which I have made for the present purpose; I believe they contain all the information that is necessary for the present purpose as far as the returns furnish it. It is necessary to observe that they are uncorrected for sex, that they give recorded rates only, and that the estimates of population are rather above the truth in all probability. I do not fill up the column for density, for reasons which (in the absence of annual enumeration) may be inferred from what is said under Sections I. and II. The means of making trustworthy comparisons between selected districts do not, in my opinion, exist :—

Metropolitan District, 1885.—Recorded Rates.

Year.	Population Estimated at Middle of Year.	Density.	Natural Increase per Cent.	Birth-Rate.	Death-Rate.	Deaths under 1, to 1000 Births.	Death-Rate from Principal Zymotic Diseases per 10,000. Small-Pox.	Measles.	Scarlet Fever.	Diphtheria and Croup.	Whooping Cough.	Enteric Fever.	Diarrhœal Diseases	Zymotic Death-Rate per 10,000.	Death-Rate from Typhoid and Diarrhœal Diseases per 10,000.	Percentage of Deaths – Typhoid and Diarrhœal to Total Deaths.
1875	161,126		1·09	37·67	26·80	176·93	..	16·32	13·65	6·14	0·124	7·19	26·06	69·51	32·25	12·43
1876	167,294		1·31	38·06	24·96	169·91	..	0·06	27·67	6·33	0·119	7·65	18·41	59·71	26·06	10·44
1877	176,419		1·88	37·66	18·82	156·20	0·226	..	0·452	6·17	1·02	5·66	18·76	32·32	24·43	12·97
1878	187,635		1·69	38·14	21·16	173·37	..	..	0·213	6·76	9·00	9·06	20·30	45·35	29·36	13·87
1879	200,604		1·97	39·18	19·46	153·41	..	0·049	0·099	5·38	0·448	5·73	19·88	32·5	25·62	13·16
1880	214,221		1·6	38·99	22·96	192·24	..	9·98	1·02	3·92	4·57	4·15	18·71	42·38	22·87	9·95
1881	227,731		2·0	39·14	19·11	162·02	0·746	0·614	0·395	1·97	2·1	4·08	15·63	25·55	19·71	10·31
1882	241,761		1·9	39·83	20·77	183·28	0·951	0·124	0·206	2·56	0·744	6·9	21·17	32·72	28·08	13·52
1883	258,514		2·1	39·80	18·75	163·26	..	0·889	0·386	5·02	0·309	6·57	16·24	29·43	22·82	12·16
1884	278,999		2·13	42·62	21·24	171·9	0·107	0·250	2·11	3·29	3·98	7·49	17·52	34·78	25·01	16·36
Average of Ten Years 1875-84	211,430		1·81	39·33	21·17	170·47	0·222	2·487	3·831	4·54	2·284	6·419	18·999	38·79	25·444	12·005
1885	301,426		1·91	40·69	21·54	186·08	0·033	0·099	2·02	4·54	0·862	7·39	18·77	33·73	26·17	12·15

Country Districts, 1885.—Recorded Rates.

Year.	Population Estimated at Middle of Year.	Density.	Natural Increase.	Birth-Rate.	Death-Rate.	Deaths under 1, to 1000 Births.	Death-Rate from Principal Zymotic Diseases per 10,000.							Zymotic Death-Rate per 10,000.	Death-Rate from Diarrhœal Diseases and Enteric Fever per 10,000.	Percentage of Deaths from Diarrhœal Diseases and Enteric Fever to Total Deaths.
							Small-pox.	Measles.	Scarlet Fever.	Diphtheria and Croup.	Whooping Cough.	Enteric Fever.	Diarrhœal Diseases.			
1875	423,403		2·36	38·86	15·23	98·49	..	11·57	1·93	4·55	2·40	4·29	10·38	35·13	14·68	9·64
1876	436,944		2·26	38·74	16·05	91·37	..	0·778	14·73	5·99	0·342	6·24	8·37	36·48	14·62	9·10
1877	952,524		2·35	38·02	14·46	101·53	..	0·044	1·9	6·98	0·287	6·07	10·93	26·23	17·01	11·75
1878	470,162		2·42	38·64	14·44	103·74	..	0·021	0·404	8·03	4·21	5·76	11·69	30·13	17·46	12·08
1879	490,064		2·60	38·91	12·82	88·08	..	0·040	0·224	7·81	2·44	3·06	7·15	20·77	10·24	7·98
1880	511,454		2·63	36·72	12·33	80·47	..	1·09	0·547	4·00	0·662	2·91	6·43	15·68	9·36	12·7
1881	532,560		2·42	37·70	13·48	94·51	..	1·38	0·488	3·98	2·02	3·24	8·75	19·88	11·99	8·89
1882	553,000		2·22	36·29	14·09	106·21	..	0·126	0·614	5·17	1·64	5·11	10·16	22·83	15·28	10·84
1883	575,774		2·37	36·45	12·68	90·9	..	0·416	0·625	5·8	0·764	3·94	7·46	19·19	11·41	15·62
1884	601,847		2·28	36·67	13·78	101·65	..	0 647	0·28	3·87	1·49	5·1	8·24	22·16	13·34	9·68
Average of Ten Years, 1875-84	504,782		2·39	37·81	13·86	95·65	..	1·442	2·248	5·55	1·614	4·536	8·888	24·28	13·42	9·68
1885	629,504		2·22	36·18	13·96	101·15	..	0·127	1·03	7·06	1·42	4·44	7·14	21·25	11·59	8·36

I may mention, in conclusion, that the following Bills and Select Committees have been introduced or appointed by one or other House during the past few years:—During the session of 1885-6, a Public Health Bill was introduced in the Council by the late Mr. Dalley; it was interrupted by Prorogation of Parliament, and not re-introduced. During the same session, a Bill to regulate the practice of Cremation was introduced in the Council by Dr. Creed, and passed; it was sent to the Assembly, interrupted by Prorogation, and re-introduced in the Council; it was then dropped. A Bill to amend the laws relating to the Medical Profession was introduced in the Assembly by Dr. Tarrant; it passed that House, was sent to the Council, and was interrupted by Prorogation. A Government measure to proclaim a site on which Noxious Trades might be carried on, passed the Assembly; it was sent up to the Council, was referred to a Select Committee of that House, and was dropped. During 1887-8, a Factories and Workshops Regulation Bill was introduced in the Council by Dr. Renwick, and passed; it was sent to the Assembly for concurrence, and was not returned. Two Select Committees of the Council were appointed on motion of Dr. Creed, one to enquire into the law relating to the Registration of Births, Deaths, and Marriages, the other to enquire into the laws relating to the Practice of Medicine; and they reported. A Bill to amend the Law relating to the Registration of Births, Deaths, and Marriages, was introduced in the Council by Dr. Creed, and being ruled by the President a money Bill, was dropped, and not re-introduced elsewhere. Leave to introduce in the Assembly a measure to amend the laws relating to the Practice of Medicine was granted to Dr. Cortis, but the Bill being ruled by the Speaker to exceed the leave, was not accepted; it was re-introduced after amendment, and thrown out. The Government introduced a short Bill to prohibit the Sale of Diseased Animals for food, and to amend the law relating to the sale of Diseased Meat, and was thrown out. A Bill to Regulate Common Lodging-houses was introduced in the Assembly by Mr. Cameron, and thrown out.

STATE MEDICINE IN NEW SOUTH WALES, WITH SOME REMARKS ON THE MEDICAL ACTS OF THE COLONY.

By C. W. Morgan, M.D.

The thoughtful address of Dr. Whittell, the Chairman of the Section of State Medicine at the First Intercolonial Medical Congress, dwelt on the duty of the State, in providing for the removal and prevention of disease, and indicated the objections to the principle of appointing members of corporations, or of shires, or of district councils, to be local boards of health, which his experience of the working of the Health Act of South Australia suggested. Dr. Whittell contended that the public health was too sacred a subject to be committed to the care of gentlemen who, not being impressed with its importance, placed

it in a secondary position; and, while advocating the principle of a central authority, armed with the fullest powers to control and direct local boards, he insisted upon the importance of the latter being composed of persons having a knowledge of sanitary laws, who would act independently of local consideration. In the few remarks I have to offer to the Section, I wish to pursue the lines which Dr. Whittell opened on the occasion referred to, and to point out some particulars illustrative of the eminently unsatisfactory condition of the administration of public health in New South Wales, believing that a meeting of representative members of the profession from all the Australian colonies, affords a legitimate opportunity for discussion of any broad question affecting the public health of each and every one of them; and in the hope that suggestions may be made for the remedy of defective conditions.

The laws relating to medicine, either as regards the profession or the public, in New South Wales, are few and feeble. There is neither a Public Health Act, such as obtains in Victoria, South Australia, Queensland, Tasmania and New Zealand; nor is there a Medical Practitioners' Act, which defines the status of the medical profession, or confers such privileges on the legally qualified practitioner as are enjoyed both in the United Kingdom, and in most of our sister colonies. From some cause or other, an active antagonism to the medical profession has arisen in Parliament, and there exists a strong objection to place us on a footing which, we think, our education and service to the State and the public deserve. The few Acts having reference to medical practitioners are:—(1) "An Act to Define the Qualifications of Medical Witnesses at Coroners Inquests and Magisterial Inquiries" (1838); (2) a "Registration Act, under which a Medical Board was appointed in the same year; and (3) "An Act which Provides for the Registration of Foreign Diplomas, and Imposes a Penalty for False Declarations" (1855). A perusal of these Acts will show that they are very imperfect, and neither afford a safeguard to the public, nor protect the position of those who are registered under their provisions.

The "Medical Witnesses Act" provides that—"When it shall appear to a coroner or justice that a deceased person was not attended immediately before his death by any legally qualified practitioner, such coroner or justice may issue a summons for attendance, as witness at such inquest or inquiry, of some legally qualified medical practitioner in actual practice, who shall reside near the place where such inquest or inquiry is holden," and if such summons is disobeyed, the penalty for non-attendance is from £3 to £20. This seems plain enough, but in the teeth of such enactment, it frequently happens that unqualified practitioners are called upon to attend coroners' inquests, and their evidence is received as if they were, in all respects, entitled by law to be considered skilled witnesses. This course is adopted as an expedient in remote places, where no registered practitioner can be procured; but even in such a contingency, it is improper that the evidence of an unqualified man should be accepted as that of an expert, and this sometimes leads to a false issue. But another practice obtains, which is still more objectionable. Coroners frequently accept unqualified assistants as witnesses, on the ground of their having attended the deceased on behalf of their principals, and this in direct contravention

of the terms of the Act, as above quoted, and is mischievous in a variety of ways. It happens, not unfrequently, that the evidence of unqualified medical men is received at Quarter Sessions, in cases of assault and minor offences; and even at Courts of Assize, in trials for capital crimes, and thus the life and liberty of the accused have, more than once, depended on the testimony of a person without legal authority to be considered an expert or skilled witness. A case of this kind fell under my personal knowledge at an Assize Court, held at Bathurst, in 1871. A young man was condemned to death for rape, chiefly on the evidence of an unqualified medical witness, whose testimony was so loose, and displayed so much ignorance, that the medical profession memorialized the Governor of the day for a pardon, on the ground of its unreliability; but, though every influence was used by the public in supporting the action of the profession, it was, with the greatest difficulty, that His Excellency was induced to commute the death sentence to imprisonment for life, the first three years in irons. This case will show how little the public is protected by the "Medical Qualifications Act." I do not say that the evidence of an unqualified practitioner is preferred, but in the absence of a legally qualified medical witness, it is taken on the ground of expediency, and presented to the jury irrespective of its intrinsic value, and until recently, has been paid for out of the sum voted by Parliament annually for medical services.

Nor does registration of diplomas under the second Act referred to, confer exclusive privilege on the profession. It is certainly the custom to require applicants for appointment to country hospitals, or for the medical attendants of benefit societies, to be registered practitioners, but I could cite several instances in which clubs, hospitals, and other appointments have been held by persons who have no qualification at all. Again, the Government frequently places the unqualified practitioner in the Commission of the Peace, or appoints him coroner for a country district, and this assures him, at once, position of authority, and throws round him the ægis of State recognition.

The moral effect is to shake popular faith in the legitimate profession, and to underrate the value of registration. The public, very naturally, supposes that the unqualified practitioner would not be so recognised by the State, if the Government had any consideration for legal qualifications; and, it is generally assumed, that persons so distinguished possess a natural aptitude for treating disease, which is superior to the educational training of the registered practitioner. Such recognition on the part of the State of unqualified men in New South Wales, is naturally humiliating to the profession, and various efforts have been made, hitherto without success, to place the practice of medicine on a satisfactory legal basis, by Legislative enactment.

On the occasions of the introduction of Medical Bills into the Parliament of New South Wales, the profession has had to run the gauntlet of unmitigated abuse, such as, perhaps, could emanate from no other body than a purely democratic House of Representatives. Old stories of professional incompetence and misconduct of medical men, dating from the times of long ago, when the colony was the refuge of the destitute or reckless, are raked up, and invidious comparisons are made between a class of men long passed away and the unqualified

practitioner of the present time. Circumstances, however, have changed since the old days, and the professional men who recruit our ranks are for the most part well educated, and of a superior class, eager to advance the interests of the medical science. It is high time that the profession should urge upon the State its claims to be placed on the same footing as in other colonies, and that legislation should determine who are fit to be trusted with life and liberty of the subject, or competent to perform the duties which the State imposes, or the services it requires, at the hands of the educated practitioner. The absence of a Medical Act is a misfortune, not so much in the interests of the practitioner, as to the public, whom he endeavours to serve. We are the legitimate advisers of the public in all matters of health, whether in relation to the State, or in private life; and to undervalue our educational status, to elevate pretenders and charlatans at our expense, or to shake public confidence in us by vilification, under the protection of Parliamentary privilege, is a grave wrong to a body of men, the majority of whom have never wavered in their devotion to the public, or their duty to the State.

One of the best of the Medical Acts we possess, is the "Lunacy Act of 1879." The organisation and administration of the Department for the Treatment of the Insane in New South Wales are well known, and I only refer to the Act in question to relate a rather amusing incident which came under my notice lately, bearing on the appointment of unqualified practitioners to the Commission of the Peace. The "Lunacy Act" states, that a supposed lunatic may be sent to a receiving-house for the insane by order of a Bench of Magistrates, on the joint certificate of two "medical practitioners," the interpretation clause explaining that by such a term is meant "legally qualified" practitioners. I recently saw a man who had arrived at the police station, Newcastle, under committal by a country Bench, to be forwarded to Sydney, on the certificate of an unqualified practitioner. This person had received no medical education whatever, beyond that of a chemist; yet, being a Justice and Coroner for the district, he managed to persuade his brother magistrates that, as the Act mentioned medical practitioners, without reference to legal qualification, he had a perfect right to certify. He, and the Bench also, had forgotten to look at the interpretation clause.

While on the subject of medical certificates, I may mention that there is nothing in the "Registration of Deaths Act" of New South Wales (19 Vict., 34) that touches on medical certificates of cause of death. The medical attendant is always asked for one, and never refuses to certify without good and sufficient reasons. If, however, he does refuse, or no certificate is forthcoming, it is customary for an inquiry to be made by the police as to the circumstances of the death, and possibly an inquest may be held. In case of an unqualified practitioner having attended, his certificate is received as of equal value with that of the registered practitioner; and in this laxity the State incurs a great responsibility, as there is no guarantee to the public that deceased persons have died from the disease alleged. Further, the statistics of disease cannot be correctly compiled if derived from certificates of persons ignorant very often of medical terms; therefore, the nosological tables of the Registrar-General have to be re-cast, and are,

consequently, unreliable. One direction in which reform is needed, is the passing of a "Registration of Diseases Act," of a uniform character, in the various colonies represented by the Congress.

I have thus briefly reviewed the laws which refer to the duties of the profession in New South Wales. I pass on to the consideration of those which are allied to State medicine, as protecting the public. These include the "Sale of Poisons Act" (1876), "Adulteration of Food Act" (1879), "Infectious Diseases Supervision Act" (1881), and the "Inspection of Dairies Act" (1886). We may add the various "Quarantine Acts" from 1833 to the present time. Under the "Infectious Diseases Supervision Act," a Board of Health is appointed, presided over by the medical adviser to the Government, but its functions are widely different from those of central boards under the provisions of the "Public Health Acts" of the other colonies, and operate chiefly in the direction of control of infectious diseases accidentally introduced to the ports, and of isolation of those affected; it is, however, an excellent board of advice, and affords a channel of communication between the profession and the Government. Practically, however, the action of the State, with reference to the prevention of diseases, is directed to protection from without; and the machinery for the prevention or removal of causes which operate from within the limits of the colony is of, for example, so primitive a character as to be inoperative. Immense care has been taken, and large expense incurred, in precautions against the introduction of small-pox, in spite of which, the disease has gained admission to the colony on two or three occasions; and there is nothing to prevent its becoming a pestilence, if it eluded the Board of Health's precautions, and obtained a firm foothold; but vaccination is so neglected in New South Wales, as to be virtually a dead letter. I much question whether one-third of the infant population of the last ten years have been vaccinated. There is no Act compelling vaccination, and though there are vaccinators appointed by the State in most country districts, the necessity for the precaution has never taken hold of the public mind. On the contrary, popular opinion is divided between the benefits that vaccination may confer, and the danger of accidental communication of other diseases, which, it has been asserted, may arise from the operation. The question of compulsory vaccination has been mooted more than once in Parliament; but I do not think it has ever passed the stage of a special committee, but has been abandoned as an interference with the liberty of the subject. It seems a singular fact that a practice, which statistics have shown to be a safeguard against so virulent a disease as small-pox, should be influenced by the factious opposition of a few persons obstinately antagonistic to the system, and that the opinions of medical scientists, derived from the experience of a century, should be overridden or disregarded at their instance; but it is only an evidence of the anti-progressive spirit of New South Wales in matters of sanitation. The wonderful advancement of State medicine in the mother country during the last ten years; the victories over disease which centuries of neglect and overcrowding had occasioned; the removal of accumulated filth, and adoption of modern system of disposal of sewage; the purification of air, and supply of pure water; the reform in the dwellings of the poor, and the improvement in the inspection of the food—all convey

lessons that should have influenced our rulers and excited their emulation; but it is remarkable that, as reformation in public health has progressed in the United Kingdom, our sanitary condition is daily degenerating, through the most culpable neglect and mismanagement. And in the absence of legislation to enforce sanitary rules, the very diseases the home authorities are straining every nerve to combat and stamp out, and which experience has proved to be controllable, are gaining ground, and becoming more firmly rooted in the soil of our young country.

I now proceed to detail the machinery by which the State exercises its power for the preservation of public health in New South Wales. The Colonial Secretary controls all the medical service, with the exception of the quarantine officers, who are in the Department of Finance and Trade, under the Colonial Treasurer. In all cases of emergency and danger, these Ministers take prompt action, and, being the chief members of the Executive, no power in the land could be more efficient. The responsibility of directing their actions rests with the Medical Adviser to the Government, who is also, President of the Board of Health, to which reference has been made. This Board is composed of the Secretary for Finance and Trade, the Inspector-General of Police, and the Mayor of Sydney *ex-officio*, and of five members of the medical profession, exclusive of the President, who are appointed by the Governor and Executive Council. Its functions are chiefly those of advice and inspection. There are also a number of Government Medical Officers appointed to country districts. These gentlemen are required to report quarterly to the Medical Adviser to the Government, on the sanitary condition of the localities to which they are gazetted, and to perform such services as the Government may require of them; but I do not think they have any connection, officially, with the Board of Health, and their position and functions are defined by regulation, rather than by Act of Parliament.

It will be seen that, in some respects, the organisation of the Health Board, at head-quarters, and the Government Medical Officers in the country, resembles the details of the Public Health Acts in the other colonies; but there is this material difference, that there are no local Health Boards, and the duties which such Boards would be called upon to perform, under the provisions of the "Health Act," fall on the Municipal Councils of incorporated towns, under their special bye-laws. These are framed under the "Municipalities Act," and relate to inspection, drainage, water supply, scavenging, disposal of nightsoil, &c., without any special reference to sanitary law; therefore, the control of the causes that lead to epidemics, and the exercise of proper precautions for prevention of disease, rest with bodies who are under no central authority or skilled local advice. If a town is not incorporated, the suppression of nuisances, or of the causes which lead to epidemics, rests with the police. The officer in charge reports insanitary conditions to the Inspector-General, himself a member of the Board of Health, and active steps are taken; but the Municipal process is much more uncertain and unsatisfactory. The routine of reports, reference to committee, reception of more reports, delay and discussion on adoption, have to be undergone, and, in the meantime, the opportunity of dealing with the emergency is lost. From an intimate and personal knowledge of the

routine of a Borough Council, I have arrived at the conclusion, that the importance of sanitation is a subject that the ordinary aldermanic mind either cannot understand, or refuses to entertain; nor is it difficult to explain the causes of this phenomenon, when we remember that Municipal representatives are more frequently elected from the circumstances of their being either old residents or property-owners, than from any special fitness for administration. The result of such a practice is suicidal to sanitary reform, for the oldest inhabitant is, invariably, non-progressive, and the property-holder has a strong objection to incurring expense. The sanitary reformer is, therefore, in a hopeless minority at most Council boards. It will readily be understood, that a Council knowing nothing, and caring less, about sanitary laws, will pay more attention to street-making, reclamation of land, and improvement of the value of property, than to questions of inspection of causes of disease, imperfect drainage, pollution of soil, and removal of nuisances generally; and the disregard of sanitary precaution on the part of citizens, when the exertion of Municipal authority is lax, may be taken for granted; but it happens, not unfrequently, that the Council offends against the public health, not only by faults of omission, but by those of actual commission.

This may be illustrated by the case of the Attorney-General *v.* the Borough Council of Newcastle, recently argued before the courts in Sydney, to obtain an injunction to restrict the Council from using recreation reserves as depôts for the burial of nightsoil. I will ask the indulgence of the Section if I give a short account of the circumstances of the case, because the peculiar trade relations of Newcastle with Melbourne, and almost every other colonial port, makes its sanitary condition an object of interest to every colony represented to-day. For the last two years, the Newcastle Council has had great difficulty in the disposal of the contents of cesspits and other refuse matter. The system which had always obtained was that of burial, and a nightsoil depôt at some distance from the city was used for the purpose. This was on private land, rented from the Australian Agricultural Company, but it having been alleged by the medical profession that a smart outbreak of typhoid fever in an adjacent township, was caused by pollution of wells by percolation, the Council received notice to quit. It then became necessary to select a new site, or to dispose of the obnoxious material by a different method. It was suggested that the Council should discontinue the practice of burial, and treat the nightsoil by chemical process, or remove it to sea; but this advice was not received with favour, burial being the only method which the Council understood or approved of. There were, however, great difficulties in providing a new depôt; the waste land at the disposal of the Council being very limited, and the area of the borough confined between the sea and the harbour on both sides, and met by two neighbouring municipalities on the the remainder of its boundary. But the situation was urgent, and the closets could not be allowed to overflow, so the expedient resorted to was that of burying the nightsoil in a small paddock adjoining the Hospital, which has been dedicated by the Government to the Borough Council for public purposes. To this proceeding, the Medical Staff of the Hospital strenuously objected, and the citizens joined in the protest

against establishing a nightsoil depôt in an inhabited portion of the city, to the prejudice of the public health. These remonstrances being disregarded, an appeal was made to the Board of Health, and the Chief Medical Inspector, Dr. Ashburton Thompson, was despatched to examine and report. The result of this action was a strong condemnation of the system pursued, with some stringent remarks on the insanitary condition of the city generally; and the Medical Adviser to the Government, in a report thereupon to the Colonial Secretary, recommended that the Council should be called upon to abate the nuisance complained of within four months, and failing to do so, that the Governor should be moved to exercise the powers entrusted to him under the "Nuisance Prevention Act," which provides for the Executive taking the disposal of the nightsoil out of the Council's hands. This course, however, the Colonial Secretary did not see fit to adopt, I believe from a reluctance to interfere with the administration of local authority. An appeal was then made to the Supreme Court for an *ad interim* injunction, which arrived just two days before the small paddock was completely filled with the excrementitious filth of the city. Being again in a dilemma, the next proceeding of the Council was to cart the obnoxious matter about four miles away, and to bury it in a large reserve, also dedicated to the Borough Council of Newcastle for purposes of public recreation, but situated in the heart of another municipality, a kind of *imperium in imperio.* An appeal from the ratepayers of the incorporated district so invaded, procured an injunction to stop the deposit of foreign nightsoil within the precincts of their territory; and, driven to extremities, the last resort of the Newcastle Councillors was to form a depôt within the area of the public reserve or park at Newcastle, which is situated on higher ground than the town, and in the immediate vicinity of the Hospital for the Insane and the residences of many of the wealthier citizens. The reserve is laid out as a public promenade and planted with trees, and affords the only place of exercise for the citizens, and recreation for the children. Here the system of burial took a novel form. The Corporation used an old shaft of about eighty feet deep, connected with the workings of an abandoned coal mine, as the place of deposit. The contents of the night-carts were emptied down the shaft at night; care was taken to keep the mouth of the shaft closed and a high fence was erected round it. This conversion of the public recreation grounds into a nightsoil depôt, caused great indignation among the residents of the neighbourhood and the citizens generally, and the Council was beset with remonstrances and protests, which it met with the contention that, as the nightsoil was deodorised, there could be no annoyance, and that the free use of disinfectants removed any source of danger. An injunction was again applied for, but from some technical causes, was not granted until the third application, and it was not until after a year that the case was argued before the Chief Judge in Equity, who decided that a nuisance existed; but as there were great difficulties in the disposal of nightsoil, the Council was not to blame; and in granting the prohibition, His Honor allowed four months before it came into force, to allow the Council time to perfect some other scheme.

During all the time that this litigation was proceeding, the Council continued the process of storing up the nightsoil in the bowels of the

earth, which now contain between 2000 and 3000 tons of accumulated fæcal matter, the evil results of which, time and circumstances will probably develop.

I cite this case, because it affords a very good example of the imperfect system under which the public health is administered in New South Wales, and a cogent argument in favour of reform. It seems incredible that a Council should have persisted in ignoring the opinions of the medical profession, and continuing a practice by which the public health was endangered for a period of two years, and that the people could find no redress. The Government even declining to interfere when the health of the inmates of a lunatic asylum, supposed to be under the special care of the State, was jeopardised, and the recovery of the patients at a general hospital prejudiced. Other methods of disposing of the nightsoil were frequently brought under the notice of the Council, and after all. their action resolved itself into a question of expense, for proposals made for the erection of chemical works, were rejected as too costly, as was also the offer of a local firm of steamer proprietors to convey the nightsoil by steamer and deposit it on a uninhabitable island at a distance where it could have done no harm. Under the provisions of a Public Health Act, a vigorous central authority would have exercised his powers, and so lamentable a display of incompetency could not have been permitted.

The history of municipal shortcomings at Newcastle is not exceptional. There are numerous instances familiar to most medical men in which Municipal Councils in each and every of the colonies represented, have committed grave errors in sanitary matters, for the simple reason that they are unacquainted with the subject, and object to be dictated to. From conversation with members from various parts of Australia and New Zealand, I am convinced that the sister colonies stand equally in need of sanitary reform as we of New South Wales. There is nothing to prevent as perfect a condition of sanitation in the Australian colonies as obtains in England at the present time. We have not the overcrowding and poverty to contend with, our climate is one of the most healthful in the world, and we have ample means at our disposal. What we require is (1) special legislation, (2) organisation and co-ordination of authority, and (3) what is most important, the sympathy and assistance of the public, who, at the present time, display an apathy in all matters of sanitation, from which they can only be aroused by instruction in hygienic laws, and a realisation of the danger incurred by their neglect. It is unjust to blame local authorities for the careless habits of individuals, yet it is by the want of cleanliness and care in household premises that epidemics generally are fostered. It is lamentable to contrast the assertion of the English authorities, that no soil exists in England favourable to the propagation of cholera, under the sanitary precautions exercised under her laws governing State medicine, with the following extract from the report of Dr. MacLaurin, the Medical Adviser to the Government of New South Wales, on the sanitary condition of Newcastle:—"From the position of Newcastle, as a large seaport, it is eminently exposed to the introduction of epidemic diseases, such as cholera, yellow fever, and the like. Should any such disease take root in the town in its present filthy condition, we may reasonably expect an outbreak which would be fatal to the progress of

Newcastle, and highly injurious to the whole of Australia." The exceeding virulence of our constant epidemics, as enteric fever, diphtheria, scarlatina, with occasional outbreaks of erysipelas and septicæmia, assure us that the case is not overstated.

In conclusion, I would remark, that the medical profession has now an opportunity of impressing on the State the importance of legislation on Public Health. So representative a meeting as this Congress, comprising the highest rank of the medical confraternity in Australasia, the most learned, the most able, and the most influential of so widely spread a body, and under the patronage of Her Majesty's representatives governing her several colonies, cannot be disregarded. In bringing forward the subject of defective Medical Acts, and imperfect administration of Public Health, I am actuated by no other motive than the public weal. I am sure there are good men and true men in the Parliament of New South Wales, who will heartily enter into the question of medical legislation, if they can be impressed with its importance; and I trust, before the conclusion of the Congress, special committees will be formed, to consider the details of reform, with a view to making representations to the various Governments of the Australian colonies, so that some degree of uniformity may be arrived at, in the Public Health laws of the whole, and that the position of the medical profession, with relation to the State and to the public, may be established on a basis at once just and honourable; that the State will recognise the position and value of the practitioner, to whose services it owes much, and that the public will learn to regard us, not simply as servants, but as instructors and friends.

HYGIENIC CONDITIONS IN VICTORIA.

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It has been thought a fitting time, during this Congress, to place upon record some reliable and fairly complete accounts of the state of sanitary matters throughout Australasia, and, in the regretted absence of worthier men, it has fallen to my lot to undertake this important task, so far as the colony of Victoria is concerned.

The subject is treated under the three natural headings—of personal, public, and legal hygiene; and the paper closes with a summary, embodying the writer's views upon the points therein discussed. These, of course, are matters of opinion; the rest of the paper deals with matters of fact.

Personal Hygiene.

(A) *Inheritance.*

The new race now springing up in Victoria is descended from a healthy parentage. To quote the discriminating description of a recent distinguished visitor, Dr. Dale—"The colony may be said to have been created by the great rush for gold, in 1851 and the following years. In 1850, before the rush began, the population was a little over 76,000; in 1854 it had risen to more than 312,000, of whom 205,000 were males; the net immigration from 1850 to 1860 was nearly 400,000; the immigrants remaining in the colony at the end of ten years were five times as numerous as the whole population at the beginning of the period. The men drawn to the diggings were, for the most part, men of exceptional physical vigor, of courage and daring; indifferent to hardships, and careless of danger. They lived a rough, wild life. Only those who were capable of great physical exertion, and of great physical endurance, were able to stand it for long. Of the rest, some broke down: some drifted into other employments; some ultimately settled in other colonies; others returned to England. But the majority of the strong remained, and they were numerous enough to impress their own character on the colony. When they left the diggings for other employments, they carried with them their boldness, their force, their confidence in themselves and their own resources, their vigorous individualism."

The offspring of such parents, naturally, inherited a sound bodily constitution, noticeable illustrations of which are to be found in their universal love of sport and excellence in athletic games. But equally naturally, such ancestry meant also a predominance of the neurotic temperament in its descendants, and the tendency thus inherited has been accentuated by climate and environment. The "nervous temperament," indeed, characterises all strata of society—forming the basis of the energy, the push, the restless activity of mind and body, the keen receptivity of the Victorian people; and pathologically evidenced in the prevalence of lunacy, epilepsy, diabetes, and other nervous disorders. Healthy, but neurotic, is thus the Victorian birthright.

(B) *How the Inheritance is treated.*

(1) *Food.*—There being an absence of abject poverty, and of profound dietetic ignorance, rickets is practically unknown amongst our children. All classes, however, alike commit the grievous error of consuming an excessive amount of meat, as is shown by the following statistics:—

(*a*) Dr. Wilson, head-master of the Church of England Grammar School, one of our largest public schools, reports that upon a "beef basis," boys under sixteen years of age eat about 1 lb. of meat per day, those over that age eating $1\frac{1}{3}$ lbs. On a "mutton basis," he would deduct $12\frac{1}{2}$ per cent., as the waste is less. These amounts do not include fish, bacon, or fowl.

(*b*) Captain M'Callum writes from the recent cadet encampment:—"There are 1850 cadets and 150 mounted rifles in camp. To the former, six meat meals were served; to the latter, eight. A calculation

shows that $\frac{11}{12}$ lbs of meat were consumed per head per meal, the meat comprising corned beef, sausages, preserved meat, fresh beef and mutton (including bone), and dried fish. The regulation allowance to militia companies," he adds, " is 2 lbs of fresh meat per man per day."

(*c*) Mr. J. L. Currie, a well-known squatter, thus writes :—" My sheep-shearers are twenty-four in number. They work six or seven weeks: their work is probably the most wearing that a man can engage in. The average consumption of meat per man per day for the six seasons 1883–88, as weighed out to the men, was 2 lbs. 10$\frac{1}{3}$ ozs. This amount includes bone, and does not make any allowance for waste." The weekly allowance for ordinary station hands, as Mr. Inglis informs me, used to be " 10 and 10 and no fat " (*i.e.*, 10 lbs. of meat and 10 lbs. of flour).

(*d*) As regards the community generally, the Government Statist, Mr. Hayter, informs me that the daily rate for the past five years has been ·77 lbs. for all persons over two years of age, or over 1 lb. per day for the adult population.

(*e*) As regards the consumption of foods generally, Mr. Coghlan, the Government Statist of New South Wales, has forwarded me the following suggestive table. I assume that Victoria may be placed alongside New South Wales in the main conclusions :—

Consumption of Foods.

Articles of Consumption.	New South Wales.	Great Britain.	France.	Germany.	United States.
	lbs.	lbs.	lbs.	lbs.	lbs.
Grain	304	330	455	166	305
Meat	278	105	74	69	120
Sugar	95	72	21	21	23
Salt	36	40	30	25	39
Butter	16	26	7	12	18
Potatoes	221	315	550	1060	150
	ozs.	ozs.	ozs.	ozs.	ozs.
Tea	121	73	1	1	21
Coffee	11	15	52	83	115

Taking Mulhall's estimate, as given for America and Europe, this table shows an excess of food beyond requirements, to the extent of $\frac{3}{8}$, even though our population works for fewer hours, and our climate necessitates less repair.

One noticeable outcome of this excessive consumption of meat and other diet is, that a distinct hepatic tendency is being developed, and hepatic vulnerability grafted upon our neurotic inheritance. To such an extent, indeed, is this the case, that the type of the Victorian individual may almost, at present, be classed as "bilio-nervous," with all the functional disturbances and later structural changes which characterise that combination. These, as being fully described in a paper on "The Hepatic Element in Disease," in the Medical Section of this Congress, need no further mention here.

(2) *Stimulants.*—Mr. Hayter computes that the average annual consumption per head of the Victorian population is, in gallons—beer, 16·41; wine, 1·01; spirits, 1·12—equivalent to 32·88 gallons of beer. That of the United Kingdom is given at 37·11 gallons; that of the United States at 27·93 gallons. Mr. Coghlan gives the quantities for those over eighteen years of age throughout the colonies as 22·6 of beer, 1·3 of wine, and 2·1 of spirits. No doubt, Victoria does not depart far from the average. The quantities of tea and coffee have been already given. It is difficult to draw fair conclusions upon these points. The beers drunk, if English in name, are a specially fortified brew; if colonial, they are frequently strong and injurious. The pernicious habit of "nipping" between meals is less common than it was, but still remains somewhat characteristic of the people. Climate and surroundings are so different from the English, that Anstie's safe limit might, perhaps, be reduced amongst us to one-half. An increasingly large proportion of the population is practically teetotal. Hence the general conclusion seems to be, that the drinking population drink more, take stronger intoxicants, and suffer more extensively from the injurious effects than those in England. Tea is the main beverage of a large proportion. In the country, the necessary boiling of the water must have materially curtailed the spread of hydatids. The fact that the tea is taken as soon as made, probably explains why the injurious effects on the digestion are practically confined to a small class.

(3) *Clothing.*—In clothing, as with diet, Victorians have, unfortunately, followed the fashion of colder and more equable climates. The clothing generally adopted is, in several respects, ill-adapted to the requirements. Black is, in the cities, the rule rather than the exception. Too often the material is cotton, instead of woollen. In our climate, and amongst our population, both these fashions result in much injury to health. Lastly, ill-ventilated hats, or non-ventilated hats, are very largely worn.

(4) *The Skin.*—A very large proportion of Victorian houses contain bathrooms, but there is a great dearth of washhouses and baths for the poor. There is great need of free, or nominally free, fresh and salt baths. With us, public baths are expensive monopolies.

(5) *Exercise.*—Plenty of exercise in the open air is one of the greatest characteristics of the people. By custom, nearly all trades work only eight hours per diem. All business places close at noon on Saturday, and public holidays are very numerous. By Act of Parliament, no children can be put to work in shops or factories under thirteen years of age; and all shops, except those for refreshment, or such as are specially permitted, close each evening at an early hour. A larger proportion of the population are thus spending a longer period in the open air, than can perhaps be found in any similar Anglo-Saxon community. Generally, the time is healthily spent, and the result must be decidedly beneficial. Perhaps the merchants, as a class, are too little given to following the English custom of getting completely away from business for some weeks each year. They have not yet learnt the lesson, that it is an economy to do so.

(6) *Occupations and Population.*—The following table is taken from Mr. Hayter's "Year Book":—

Occupations of the People, about the Middle of 1887 (Estimated).

Occupations of the People.	Mean Population.		
	Males.	Females.	Total.
Ministering to Government	5,681	287	5,968
,, Religion	1,299	239	1,538
,, Health	2,327	1,867	4,194
,, Law	1,515	..	1,515
,, Education	3,192	4,882	8,074
,, Art, Science, and Literature ..	3,138	1,244	4,382
Traders	17,314	2,297	19,611
Assisting in exchange of money or commodities ..	8,008	766	8,774
Ministering to entertaining and clothing ..	17,747	31,637	49,384
Domestic servants	3,517	25,511	29,028
Contractors, artisans, and mechanics	55,514	1,244	56,758
Miners	26,000	..	26,000
Engaged in pursuits subsidiary to mining ..	1,028	..	1,028
,, pastoral pursuits and agriculture ..	93,226	48,390	141,616
,, pursuits subsidiary to grazing and agriculture	4,004	1,197	5,201
,, land carriage	17,423	383	17,806
,, sea navigation	3,950	48	3,998
Dealing in food	16,773	2,058	18,831
Labourers	28,785	..	28,785
Engaged in miscellaneous pursuits	1,136	96	1,232
Of independent means	2,868	1,340	4,208
Wives, widows, children, relatives, scholars ..	200,953	350,836	551,789
Public burthen	7,575	4,260	11,835
Of no occupation	1,461	48	1,509
Unspecified	16,636	..	16,636
Total	541,070	478,630	1,019,700

The general hygienic results which follow from these data, need no comment. The evils attendant upon unhealthy occupations must be minimised by the outdoor life and limitation of the hours of labour, and by the fact that up to the present time overcrowding exists only in some metropolitan localities. Further, such trades are under the control of the sanitary authorities, and there is authorised inspection of all factories and workshops.

(7) *Other Personal Conditions.* — Education is free, secular, and compulsory upon all. A school certificate, as well as a health certificate, is required in all factories and workshops. The State schools, which are, generally, models of architecture, are provided with filters for drinking purposes, but the closet and urinal arrangements are often defective. In very few cases is education carried to the extent of producing "brain fag." In the opinion of many, however, insufficient prominence is given to the basement ideas of the moral sense—reverence, self-control, and altruism—and in the opinion of the writer, the unhealthy results of neglecting these fundamental sanitary laws are increasingly apparent.

Public Hygiene.

(*a*) *The Sanitary Atmosphere.*—In a new country, where the land has to be opened up, and towns and cities built upon a virgin soil, it is but natural that sanitary matters should not be the first to be placed upon a satisfactory basis. Still, in Victoria, such matters have commanded a large share of attention. Thus, the different newspapers throughout the colony continually devote a large quantity of their space to the discussion of sanitary subjects. The State school programme provides for instruction in the laws of health, to the scholars in its 2000 schools, and a course of physiology for its pupil teachers. The Working Men's College makes similar provision for those more advanced in years. An Australian Health Society has existed since 1875, with some 500 subscribing members. Since its origin, this Society has organised fifteen series of public health lectures, and seventy-eight health meetings for wives and daughters; has arranged a series of cooking classes; and published twenty-three original pamphlets, and numerous wall-sheets and other sanitary diagrams, some of which have been posted up on all railway stations and in all State schools. The St. John's Ambulance Association, also, have a Victorian centre, with twenty-seven sub-centres. By its means, 2267 men and 1260 women have been instructed in the principles of first aid, of whom 591 are railway employés and 119 policemen. Questions affecting sanitation and hygiene are thus brought well before the public mind, and the public is being educated to take a rational interest therein.

(*b*) *Climate.*—The 56,000,000 acres, of which Victoria is composed, may be divided into—(1) an extensive seaboard, open to polar currents and ocean winds; (2) an extensive and wooded mountain-range, running across the whole breadth of the colony, its higher portions often snow-clad; and (3) the generally arid sub-tropical interior on the northern and western boundary. The phenomena associated with the cycle of the seasons may be grouped as follows:—Spring embraces September, October, and November. The weather is usually mild, genial, and pleasant. Strong northerly and westerly winds prevail. Generally the rainfall is large. Summer embraces December, January, and February. The temperature may rise above 100° in the shade, but sudden and great changes are frequent, heavy rains and cold gales replacing the hot, dry weather. The latter months are often extremely hot and dry, yet cooler and more pleasant weather frequently intervenes. Autumn—March, April, May—is the most genial part of the year, though invaded by storms, gales, and large rainfall. It constitutes a second spring, the trees often putting forth a growth exceeding that of spring. Winter—June, July, August—is usually cold and bracing, with frequent rain and strong winds. Sometimes, however, it is remarkably dry. In Melbourne, the thermometer is seldom below freezing-point.

Coming to individual resorts, Melbourne has a mean average annual temperature of 57·6, placing it on the same isotherm as Lisbon, Florence, &c. The average rainfall is 25·6 inches. Northerly winds prevail, especially in winter; south and south-west being next in frequency. Both barometric pressure and temperature are exposed to great and rapid changes, 20° or 30° fall frequently occurring in as many minutes,

and 80° having been noted within twenty-four hours. The drawbacks are the great heat of summer, which, though generally dry, is depressant when continued, and the great diurnal variations of temperature and pressure. Spring and autumn are generally very pleasant, and the winter bracing, if wet. Suitable changes are—to Adelaide or Sydney during the winter, to Tasmania or New Zealand during the summer, or to the Victorian resorts as indicated below:—Ballarat: 1438 feet above the sea. Mean temperature, 53·6; generally moister than Melbourne, though the rainfall is the same; cold and bleak in winter; in summer not so hot in the daytime, and always cooler in the night. Daylesford: 2000 feet above the sea. Partly sheltered on the south. Mean temperature, lower than Ballarat, and less bleak; generally a very pleasant and salubrious climate. Beechworth: 1783 feet above the sea. Mean temperature, 57·2; rainfall, 31·6. Climate salubrious and invigorating, with a characteristic subalpine flavour from the neighbouring high ranges; the mean winter temperature is 47·8—a small difference from the annual, compared with other places of a similar altitude, and a feature which adds much to the value of its climate. Macedon, consisting of the village of Upper Macedon, 1900 feet high, and Mount Macedon 2000 to 3000 feet in height. Taking the latter first, the mean summer temperature is about 15° below that of Melbourne, and the highest shade temperature seldom rises above 92°, though, as is the case at all high altitudes, the direct heat of the sun's rays is greater than at lower levels. The air is moister than on the plains. The southern slopes are exposed to the ocean winds, and changes of temperature are often sudden and very great. The nights are generally quite cold. The cloud line frequently falls to the 2000 feet level, giving rise to dense mists, even when cool calm nights succeed warm calm days. From May to October, the weather is bleak and wintery. The village of Upper Macedon has the same characteristics, modified by the difference in altitude and physiographical position. Lying low, it is exposed to northerly and south-west winds, which are too cutting for the most robust in winter. It is usually free from mist and cloud. The mean temperature is 49°.

Riverina belongs, territorially, to New South Wales, and is generally hot and dry in summer, but subject to considerable extremes of day and night temperature. It may be discussed here as a type of the sub-tropical interior. The winters, as a rule, are warm and pleasant, and the general conditions very salubrious. Generally, as to others, the most equable climates are near the coast, the least equable between the coast and south face of the ranges, and on their southern slopes. Fine climates are found in the valleys and plateaux between the coastal and northern faces of the ranges, such as Omeo, Harcourt, &c.

Low level and sheltered valleys amongst the higher ranges are objectionable; in summer the heat is great, and the air stagnant, whilst in winter the winds are cutting; the frosts very severe. Sorrento, Flinders, Phillip Island, Lorne, the Lakes Entrance, Portland, and Warrnambool, all possess the characters of the maritime climates. In Portland, the seasons are later, the summer much milder than in Melbourne.

For the foregoing account, I am mainly indebted to the Government Astronomer, Mr. Ellery, F.R.S.

Summarising some of the conclusions, we find that Melbourne proper has a climate quite unsuited to phthisical cases. Of this fact, there is urgent need that our brethren in England should be much more fully apprised than they seem to have been hitherto. Again, its variability is a fruitful source of bronchial, rheumatic, and hepatic attacks; whilst its trying summer often induces anæmia, especially in young girls, and causes a large mortality amongst infants. Next to the summer, the autumn quarter is the most fatal.

(c) *Surface Conservancy, Drainage, Household Construction, and Removal of Excreta.*—Here we meet with the great blot upon Victorian sanitation, the reason why, in this new and healthy country, and amidst surroundings which are mainly conducive to health, a young and vigorous community continues to suffer under an excessive death-rate. Surface conservancy is nowhere efficiently carried out. In many of the townships and boroughs, there is a great want of paved channels of any kind, and no system of town cleansing is ever attempted. Everywhere the maxim, "Own dirt, no dirt," is accepted as an axiom. Individuals and authorities are alike to blame. Coming to the metropolis, we have, in Melbourne, a city far dirtier than there is any reason for it to be. The streets are broad and well planned; but as much pulverised bluestone careers about wildly, in dust storms, as remains quiet upon the roadway. Footpaths are generally untidy, the open drains and gutters are almost always pervious; rights-of-way dirty and wet. The offshoots of the main streets smell, at night, like badly kept cesspools, such is the deplorable lack of public urinals and closet accommodation. Round the corner of the imposing Town Hall meanders a rivulet laden with foul odour—it has smelt just the same for some years. In most of the suburbs, these evils exist in even greater degree—many streets, roads, and rights-of-way are devoid of all sanitary requirements. Tips and slop-sodden ground abound. Sweeping, flushing, and cleansing are very inefficiently performed. It would be interesting, indeed to know, in acres, the total area of filth in and around Melbourne, in the shape of dirty rights-of-way, neglected dust-bins, sodden manure heaps, made ground polluted in diverse ways; soil pans in use or empty, but dirty; road sweepings, cinder and rubbish heaps, stagnant fœtid drains, and the like. And, to crown all, we have converted our beautiful water-way, the Yarra, into a magnified, obnoxious, open sewer.

(d) *Drainage.*—An even greater sanitary misfortune is the total absence of a properly-designed system of drainage alike in country, towns, and cities. Originally, most towns are laid out without any provision for drainage, and none may be made even when land is sold and fresh houses erected. When, however, a higher grade in municipal life is reached, open drains are constructed to convey liquid filth through the city streets. In their construction, many of the canons of sanitary science are disregarded, mainly because they were unknown. In all, the final exit is not an intercepting sewer, but the nearest water-way. As a rule, no wise foresight seems to be displayed ; each municipality is content to free its own boundaries. Why should it care about others? They do not pay it rates. As an illustration of the waste of money which such parochial views finally produce, it may be mentioned that

the City of Richmond Council have recently raised a loan of £50,000 to carry out a system of drainage, to terminate, as usual, in the hapless Yarra, regardless of the fact that such pollution is a temporary expedient, the doom of which is near at hand. The same pollution awaits most of our country streams and watersheds, where it has not already overtaken them. Even the Yan Yean reservoir is threatened. For want of timely legislation, rights are obtained, and works undertaken, at a subsequent cost of many thousands of pounds and much injury to the public health. The kindred question of subsoil drainage may be dismissed in one significant sentence—it is a thing unknown. It must be admitted, however, that both these questions have entered lately within the sphere of legislation, as will be seen when we come to discuss State hygiene.

(*e*) *House Construction.*—Victoria presents two-thirds of its surface occupied by strata of sand, clay, limestone, gravel, and conglomerate, and the remaining third of lower Palæozoic formations, or coal-bearing Mezozoic strata—on the whole, a healthy site for habitations, and one free from malarious influences. Sanitary house construction, however, is a practice more honoured in the breach than in the observance. A system of building has long been going on, which has lately reached its culminating point, in the phenomenal extension which Melbourne has witnessed during the "land boom." Large areas of land have been cut up into "pocket-handkerchief allotments," with streets to match. In nearly all instances, no Building Act exists, and no Local Board or other authority makes any inspection of the houses thereon constructed. From plumbers, architects, and contractors no sanitary knowledge is required. The site might be town rubbish, wet, undrained land, or corporation tip—even ground into which manure had been trenched. Regardless of Farr's law of density, that "the nearer men live to each other, the shorter their lives," jerry-builders and building societies crowd thereon hurriedly-erected tenements—in many instances little better than dog-kennels—closely packed, without drainage, with insufficient ventilation, with damp continually rising, and the terraces abutting upon streets or lanes neither paved nor drained. Interference, there is none. Soon, occupants come; the rights-of-way become accumulations of filth, the closets, disgusting and offensive nuisances—the whole a state of affairs which should not be tolerated a day in an intelligent and wealthy community. Now the more energetic of the local sanitary authorities steps in—"Would further give you notice, and require you within fourteen days from the service hereof, to form, pave, level, drain, and make good, in the manner and according to the levels and specifications approved by the said Local Board of Health, &c. &c., the street, lane, yard, and passage of the house referred to." Some system of removal of excreta is arranged, and more or less lazily carried out, and the new terrace becomes merged in the ordinary rate-paying portion of the borough. Such may be taken as a fair sketch of the construction of a large proportion of our houses. The sanitary prospects of such dwellings may be prophesied without much difficulty. We need look no further for an explanation of much unnecessary sickness and mortality. It is much to be regretted that Parliament, in passing the Amending Health Bill, struck out the clauses giving the sanitary authority a controlling power in these important matters.

(*f*) *Removal and Disposal of Nightsoil.*—With us, as elsewhere, this is the problem of the day. In many large towns, and in most scattered districts, cesspools are common, and the adjoining ground becomes the final receptacle. In better instances, the pan system, or some modification thereof, is adopted. In no part of the colony is the flush system in operation. No doubt, in many parts such a system will long remain unnecessary and impracticable. The same apathy and neglect which was noticed in respect to cleansing, drainage, and house construction, is found in dealing with excreta. Few of the drawbacks to the pan system are absent. The closets are, usually, too near the houses—the undersoil polluted, the receptacle unventilated, improperly placed, and frequently returned dirty. Removal, at best, is weekly, almost always attended with unnecessary exposure, and the contents frequently strewn along the main thoroughfares, as if the nightmen wished to show that the corporation gutters were not to have the monopoly of filth carriers. Only in individual cases are deodorants or admixtures of any kind used. True, the Corporation of the City of Melbourne has issued a bye-law, by which closets are to be ventilated and deodorants to be used, but no attempt is made to enforce it. The final disposal is equally uncertain and insanitary. In almost all cases it is carted, as just mentioned, and strewn upon the surface of market gardens. The Melbourne Benevolent Asylum, however, with a daily average of nearly 700 inmates, and situated in the heart of the city, simply buries its nightsoil in the asylum grounds, some eighteen inches below the surface, despite continued protests.*

(*g*) *Water Supply.*—The sources of water supply throughout the colony are very varied—natural springs, under and over ground tanks, artesian wells, rivers, creeks, waterholes, and lakes, are all made use of; and in the more settled parts, the waters are carried to more or less elaborately constructed reservoirs, through open races, pipes and culverts, and distributed by water carts, pumping, or pressure, as the case may be. Considerable attention has been paid to ensure purity, and almost the whole of the colony is under the control of water trusts. In many of the cities, boroughs, and shires, however, the water is not only scarce at times, but impure. Out of the 185, from which reports have been furnished to the Central Board of Health, no less than twenty-five are declared to be polluted. In 1885 upwards of fifty samples of drinking water were obtained from dams, reservoirs, tanks, rivers, and creeks, in various parts of the colony, and examined by Mr. Newbery. In the samples from unsettled districts, only the ordinary forms derived from decaying matter were obtained; but in those obtained from the surface drainage of the settled districts, micro-organisms and decaying excretal matter were present, almost without exception. This pollution of the creeks and rivers, by foul drainage, is increasing, and is one of the questions which the sanitary authorities have to face without delay. Its settlement is the more urgent, since in many instances, the drainage areas are being sold, occupied, and polluted. In this connection it may be mentioned, that in no part of the colony are the waters submitted to any coarse filtration, and that the use of domestic filters is confined to a few individuals.

* The practice has been stopped since this paper was read.

It is unnecessary to enter into the details of the different water-supply works constructed in different parts of the Colony. Brief mention, however, may be made of the water-supply of the City of Melbourne. The sources of the metropolitan water-supply are in the Plenty Ranges, some thirty-three miles distant from Melbourne. The actual water-shed area is 22,000 acres, with reservations, with an aggregate area of 54,000 acres more, the whole being unalienated Crown Lands, and the soil granite, over-laid with rich volcanic chocolate débris. The waters are taken by a series of weirs and open aqueducts, of approved composition and workmanship, to a reservoir some thirty-six acres in extent, where, by a dam they are raised to a proper level and diverted into an aqueduct, with a carrying capacity of 120,000,000 gallons per day. This aqueduct, with a gradient of 7·6 per mile, is 4¾ miles long, is very solidly built, and passes entirely through alienated and settled lands. The Yan Yean Reservoir, which now receives the water, impounds 6,400,000,000 gallons of water, 1,000,000,000 of which are below "draw off" level. Its catchment basin of about 4500 acres, however, is partly alienated, and in use as a settlement. Hence onward, through the Pipe Head and Preston Reservoirs, the water is conveyed in aqueduct and mains to the Metropolitan District. The aggregate capacity is 43,000,000 gallons per day. The maximum consumption, hitherto, has been 36,000,000 gallons. To meet the natural increment required by the growth of the City, a fresh water-shed, the Watt's River, is now being diverted towards the Preston Reservoir, at an estimated cost of £600,000. Here again, the water-shed area will consist entirely of Crown Lands, and the fresh supply available, amount to 25,000 gallons per diem. The cost to date, has been £2,480,000, and during 1888, the average daily consumption per head was 55 gallons, the maximum being 92½ gallons.*

* As regards the composition of the Yan Yean water, the most recent analysis, that of Professor Masson, is contained in the following table, taken from the Second Progress Report of the Royal Sanitary Commission, published since this paper was read:—

Analyses of Five Samples of Yan Yean Water from a Tap at the University.

(Chemical constituents estimated in parts per million.)

Date of collection	13th Jan.	14th Feb.	30th Mar.	23rd April	6th May
Temperature of the water C.	21°–22°	21·6°	21°–22°	17°–18	not determined
Colour in 2-foot tube	All samples darkish yellow.				
Odour at 40° C.	Slight in all cases.				
Reaction	Slightly alkaline in all cases.				
Total solids	75	81.5	84	86·5	95·5
Total hardness	7·8	11·1	11·1	11·1	not determined
Chlorine	23	21·5	22	24	25·5
Oxygen consumed at 27 { in 15 minutes	1·03	1·07	1·09	1·13	·84
Oxygen consumed at 27 { in 4 hours	1·90	2·05	2·02	2·38	2·68
Free ammonia *	trace	·006	trace	trace	·005
Albumenoid ammonia	·218	·130	·096	·132	·108
Nitrogen, as nitrates	·164	·137	·110	·113	not determined
Nitrogen, as nitrites	Absent in all cases.				
Phosphates	Absent in all cases.				
Micro-organisms per cubic centimetre { liquefying gelatine	20	none	none	none	5
Micro-organisms per cubic centimetre { not liquefying ,,	55	45	none	15	15

* Free ammonia less than ·005 is stated as "trace."

In connection with the question of water-supply, two questions arise of great sanitary importance—the spread of typhoid fever, and the prevalence of hydatids.

(1) Typhoid fever exists in Victoria to an alarming extent. The figures of the President of this Section, Dr. MacLaurin, are sufficient evidence upon this point. More recent statistics show that the disease is rapidly increasing. Thus, during the six months ending May 31, 1889, no less than 5159 cases, 789 of which proved fatal, have been reported to the Central Board of Health. No doubt, the main starting-point lies in our insanitary surroundings, whilst our contaminated surface and subsoil afford the germs a very prolific breeding-ground. But here, as elsewhere, a polluted water-supply has much to do with the extension of the disease. Already, numerous cases have been traced to polluted tanks and water-holes, and several epidemics have followed the contamination of creeks and rivers.*

(2) As to the prevalence of hydatid disease, Victoria still remains the second most infected country in the world, despite the fact that the danger must be materially diminished by the boiling of water in the preparation of the general country drink, "tea." Some years ago, the writer was successful in inducing the Central Board of Health to issue and circulate some 30,000 circulars bearing upon the spread of hydatids, but beyond that, little has been done preventatively. No investigation has yet been made as to the proportionate number of dogs and other animals infected, and no attempt has yet been made to attack the echinococcus prior to its entrance into water.

Legal Hygiene.

The earliest legislation affecting the Public Health in Victoria, was the "Quarantine Act," of 1832, and the "Act for Regulating Buildings and Party Walls, and for Preventing Mischief by Fire in the City of Melbourne." Both these Acts were passed when Victoria was a portion of New South Wales, and, with some amendments, remain in force to the present time.

(1) "The Quarantine Act" of 1832, of course, was framed for the exclusion of external disease. Power to take action, without waiting for an order of the Governor-in-Council, has been added under Section 12 of "The Public Health Act, 1888." For the practical enforcement of its regulations, a quarantine station, able to accommodate over 450 persons, is maintained in a high state of efficiency. There are three salaried Officers of Health for the Port of Melbourne, and medical officers at Geelong, Portland, Warrnambool, and Port Fairy, who are paid by fees, and their inspection is very thorough. Considerable discussion has, from time to time, taken place as to the quarantine system adopted by Victoria against external infection, the consensus of opinion being, that the system is well suited to our requirements. On three occasions, the passengers, &c., of large steamers have been quarantined, and as

* More recently still, since this paper was read, similar contamination has been shown to be only too probable in the case of the Yan Yean water-supply; and M. de Bavay, a pupil of the Pasteur school, has discovered in great abundance germs, which he and the writer have every confidence, after isolation and cultivation, in reporting as typical typhoid bacilli.

active measures in vaccination, isolation, and disinfection have followed the few cases of small pox which have gained an entrance, that disease has never yet obtained a permanent footing. A sanatorium, suitably situated, and capable of holding some fifty patients, was built several years ago, and is always ready for use. It is maintained by the eighteen Metropolitan Local Boards, on a rateable basis of population, and is under the immediate control of the Central Board of Health.

(2) The first Act relating to the internal health of the colony was passed in 1854, but was applicable only to "populous places." This was followed by an "Act to Prevent the Adulteration of Food." In 1865, Act 264 was passed. Part IV. of which, dealing with the prevention of the pollution of the River Yarra, and Part VI., relating to quarantine, are still in force. This was followed, in 1867, by Act 310, of which the portion, governing Cemeteries, is still in operation. Then came Acts 436 and 524, both of which have been repealed.

(3) Some of the sections of the foregoing Acts, together with a number of new provisions, and many sections based on the great English "Public Health Act" of 1875, were incorporated in 1883 in our "Public Health Amendment Act, 782." This measure was in force in its entirety until the end of last year, when "The Public Health Act, 1888," was passed. Now it is referred to as "The Principal Act."

The basis of this Act is, that a central authority composed of persons not exceeding nine, appointed by the Governor-in-Council, shall exercise a control somewhat similar to that vested in the Local Government Board of England. The non-salaried members (except two, who are Members of Parliament), draw fees of two guineas for attendance at each ordinary meeting, the total paid to any member, not however to exceed fifty guineas per annum. The Board is composed of three practising medical men (one of them being the Government Medical Officer), the two Professors respectively of Engineering and Chemistry at the University of Melbourne; the Director of the Technological Museum, the Government Analyst, a Bank Director, and a practical business man of long Colonial experience, with a Police Magistrate as President.

The local and primary authority on sanitary matters, vests in Local Boards, one for each Municipal District, and the members of the Municipal Council for the time being, form such Local Boards; every City, Town, Borough and Shire, being a separate Municipality. With the exception of some mountains in Gippsland, and the West Melbourne Swamp, the whole of Victoria is divided into Municipalities, there being 8 Cities, 9 Towns, 42 Boroughs and 128 Shires. Total 187. Local Boards have the power of making sanitary By-laws, and must make them, if required by the Central Board so to do.

At present, 170 Municipalities have By-laws more or less complete, not including a series of By-laws passed by the City of Melbourne, some of which are excellently framed. Nearly all the Cities and Towns have well-drawn building regulations adopted under the "Local Government Act."

The City of Melbourne and the Town of Geelong, were incorporated and given special powers before the separation of Port Phillip and its creation into a separate Colony.

The Act requires each Local Board to appoint a Medical Officer of Health, and also provides for the appointment of Analysts and Inspectors of Nuisances.

The Town Clerk, or Shire Secretary, always acts also as Secretary to the Local Board of Health.

Nuisances, adulteration of food, offensive trades, infant life protection, unhealthy dwellings, infectious diseases, control and regulation of dairies, removal of excreta and house refuse, closing of polluted wells and tanks, and the inspection of certain public buildings, are the principal subjects that daily come under the attention of Local Boards and their Officers.

As already stated, the Central Board has, to some extent, a controlling power; and in some cases of default on the part of a Local Board, can enforce action, or may direct the Police to prosecute offenders against the Act. In addition to this, the Central Board has the administration, under the Chief Secretary, of all matters relating to quarantine, of vaccinations throughout the Colony, and of cemeteries. No theatrical licenses are issued without the Central Board's previous approval of the building, and churches, concert rooms, stands on race courses, and cricket grounds cannot be opened to the Public, without the previous consent of the Board.

For the foregoing account, I am indebted to the kindness of Mr. Akehurst, President of the Central Board of Health.

In pursuance of the powers thus vested in it, the Central Board has continued to act with considerable vigour. In August 1884, it drafted and forwarded to all the Local Boards, a pamphlet of instructions for their guidance; and since then, it has issued model bye-laws upon the questions of their duties, regulations for the prevention of the spread of infectious disease, memoranda for the suppression of cesspools, the suppression of nuisances, the methods of disinfection, and instructions to officers of health. In addition to the annual report to the Government, it has circulated valuable papers on the prevention of small pox, the treatment of measles, diphtheria, croup, pertussis, and typhoid fever, in the absence of medical aid. Recommendations, in view of cholera outbreaks, on hydatid disease, closet and urinal construction, improved street, gutter, and open drain construction, the building and management of public structures. It has been specially energetic in pointing out how to deal with typhoid fever on railway and water work camps, and in disposing of excreta; and in 1887, it issued a special report to Parliament on the whole question, a report which was very favourably reviewed in *The Lancet.* Its final annual report, for 1887–1888, is a document of eighty-eight pages, which affords ample evidence as to the time and attention which the Central Board has given to its important duties. This report refers to the frequent failure of duty on the part of Local Boards, to the fact that only fifteen boards had attempted to carry out the law as to the adulteration of food. It deals with the treatment of threatened small-pox, and supports the Victorian practice of quarantine as, under our circumstances, safer and more efficient than the English system of medical inspection. Under the heading of nuisances, it discusses the important questions of the Elwood Swamp. the Port Melbourne Lagoon, the West Melbourne Swamp, and

individual complaints, eighty-two in number. It lays special stress on the want of public urinals and closets; and in view of the serious danger to health from the common practice of speculators in land, cutting up blocks without making sufficient provision for roads and drainage, and submits a series of clauses, bearing upon these points, for Parliamentary approval. Matters of vaccination, quarantine, water pollution, abattoirs, polluted mattresses, drainage of stables and piggeries, overcrowding in asylums, and burial of nightsoil on Crown lands, also receive intelligent and suggestive attention. Further, a general statement is given of the sanitary state of the colony, and a synopsis is presented of the reports from 185 of the Local Boards, containing a detailed account of sanitary matters in their midst, and of the chief facts observed upon official inspection. A perusal of this report, therefore, which is procurable on application to the Central Board, furnishes a fair way of arriving at an intelligent conception of many of our hygienic conditions, and the difficulties that stand in the way of their amelioration.

(4) To improve the state of matters thus shown to be very unsatisfactory, the "Public Health Act 1888," was introduced. Most unfortunately, this Act was not brought forward until the very end of Session, and to be passed at all, it had to be passed without any discussion, and in a mutilated form. Many important Amendments, however, were enacted. Thus, additional power is given to the various authorities to enforce sanitary regulations, especially against typhoid fever. The Minister may define what are infectious diseases under the Act, may order the enforcement of regulations, and in any emergency, perform all or any of the functions of the Local Boards. Notification of infectious disease is made compulsory upon medical practitioners, registrars, school teachers and members of the police force, as well as householders, and provision is made to ensure the value of such notification. A separate service in enjoined for the removal of typhoid excreta, and their disposal by fire. The Health Officer is empowered to question masters of ships, or passengers, as to infectious disease, and the Central Board may act instanter. Penalties are provided against over-crowding, and the continuance of nuisances. To prevent water pollution, the sanitary authority is made a riparian proprietor, proofs in court are simplified, and the penalties for food adulteration are raised.

(5) Conflicts of opinion, however, were still permitted, and arose between the Central and the Local Boards, and in the compromise mentioned above, important clauses, such as those regulating the powers of the Central Board, the disposal of nightsoil, the completion of rights-of-way, and the subdivision and drainage of land devoted to building purposes, had been sacrificed. Hence, there is at present before the Legislature a Bill, the main objects of which are the establishment of a Department of Health, with a responsible Minister, and the enactment of clauses equivalent to those previously abandoned.

Such is an abstract of the general sanitary legislation of the Colony. It may perhaps be claimed with justice, that it shows an appreciation of the importance of the subject, and a desire, progressively, to grapple

with it. Apart from the general apathy and ignorance, however, to which are due, here as elsewhere, most of its defects in construction and scope, it must be admitted, that a great source of failure has always been present in its ineffective execution. The great need of both Local and Central Boards indeed has been, not so much increased powers, as more inspection and better execution.

Special sanitary legislation, however, has not been forgotten.

(1) In 1874 a "Compulsory Vaccination Act" was passed. This Act requires that every child be vaccinated within the first six month's of life. All the necessary machinery, including an admirable Calf Lymph Depôt, has been provided. In 1887, the number of public vaccinators was 180, the fees and travelling allowances amounted to £5186 19s. 6d., and 85·85 per cent. of the children born in the Colony, are recorded as successfully vaccinated.

The quantities of calf and humanised lymph respectively, received and issued at the offices of the Central Board during the year, are given below:—

	Received.	Issued.				
——	Calf Lymph from the depôt, and Humanised from various Public Vaccinators.	To Public Vaccinators.	To Private Medical Practitioners.	Sent to Quarantine Station.	Sent to other Colonies.	Total sent out.
Calf lymph	15,690 points	11,861	1,966	182	592	14,601 points
Humanised lymph..	3,425 tubes	1,395	654	170	429	2,648 tubes

The above is exclusive of the calf lymph used in direct vaccinations at the Calf Lymph Depôt.

It still remains possible for unqualified men to vaccinate, provided qualified men sign the certificate, and there is no power to re-vaccinate in cases of necessity. Clauses to remedy these defects were introduced in the Amending Health Bill, but met the fate of all opposed alterations.

(2) There is a "Pharmacy Act," regulating the sale of poisons, and the registration and education of chemists and druggists. There is also a "Dentists Act, 1887," placing the dental profession upon a similar satisfactory footing. The number of registered chemists is over 600, and of registered dentists, 486.

(3) The insane and inebriate are also legally provided for. Until last year, provision was made for their treatment by the "Lunacy Statute," as amended by Act 342, and the "Inebriates Act, 1872," as similarly amended. These are now repealed, and replaced by the "Lunacy Amendment Act, 1888," and the "Inebriate Asylums Act, 1888."

By "The Lunacy Amendment Act," orders are made for conveyance to a receiving house, which may be part of an asylum, or separate therefrom. There the superintendent may discharge the patient, if not,

in his opinion, insane; or, if in doubt, may take medical opinion, and in case of disagreement, abide by the opinion of a second medical practitioner. When, however, he considers the patient insane, two medical men are to examine him, and if they agree, discharge or certify him as insane, as the case may be; if they disagree, the patient is to be examined before a police magistrate, upon fresh evidence, and his decision is final. Not only is the course of procedure thus authorised, both cumbersome and unnecessary, but, as the writer has pointed out, the medical practitioner who signs the certificate in the first instance, has to certify the patient as insane, though, within three days, his certificate has to run the gauntlet of one, two, or three fresh opinions, the result being, that he dare not certify a patient in an early stage for fear of subsequent proceedings. Thus, the value of a receiving house is reduced to the minimum. Other clauses deal with the yearly examination of all asylum patients, the boarding out of harmless patients, the establishment of separate accommodation for paying patients (all private asylums having been abolished), the separation of the criminal insane, and the establishment of philanthropic hospitals, in which patients may be maintained and cared for without charge.

By "The Inebriate Asylums Act, 1888," suitable places may be proclaimed as such asylums. To these, an inebriate may be committed on his own application, or on the certificate of two medical men, to the effect that he requires curative treatment. The term must not exceed three months, without subsequent orders, made on similar grounds. The expenses come from the inebriate himself, and penalties are provided against improper treatment.

(4) By "The Shops and Factories Act," provision is made for the sanitary condition and inspection of all shops and factories, and for limitation in the hours of labour. No children under thirteen years of age are allowed to work therein, and for all under sixteen years of age a medical certificate must be obtained from a duly appointed officer, the fee being Five shillings, payable by the applicant.

(5) The legal status of the profession is regulated by a "Medical Practitioners Act, 1865." This provides a nominee board of registration, the requirements for registration being a three years' course of study, "to the satisfaction of the board." Penalties are imposed for the assumption of certain medical titles (from which, however, oculist and aurist are absent), to be recovered by any person suing in the County Court. Until recently, such prosecutions were undertaken by the police, but a late remarkable order from the Chief Secretary has forbidden such action. The unrepresentative character of the board, the absence of power to erase names from the register, the scanty requirements in the matter of medical education, and the want of definition as to power of prosecuting, on infringement of the Act, have proved so damaging to the utility of the present Act, that the profession has under consideration an amended bill, which it is hoped will be introduced before Parliament during the present session. Meantime, though quackery is very much on the increase, unqualified men have no legal status; and in only two instances do they hold office in institutions which receive a Government grant towards their maintenance. As regards the profession, numerically, Hayter's "Year Book" for 1887 states that,

at the last census, there was one practitioner for every 1900 persons. The proportion, however, is constantly being diminished, and at a somewhat rapid rate. It would be unpardonable in this connection, to omit all mention of the Medical School in connection with the University of Melbourne, established in 1862. It has turned out more than 200 graduates in medicine, and has 236 students at present attending lectures. The course prescribed is five years in duration, four of which include hospital attendance. The range of lectures is comprehensive, the examinations noted for their severity, and the clinical facilities ample for all requirements.

(6) Lastly, Charitable Institutions are numerous, largely endowed by the State, and under State supervision. The returns of the Inspector for Charitable Institutions for the year ending 30th June, 1888, show that there are 34 hospitals in the colony, with 1289 beds for male, and 681 for female patients, with a daily average of 1455; the total number of 16,004 in-patients treated, and 43,334 distinct out-patient cases treated. There are also 10 institutions which are both hospitals and benevolent asylums, with a daily average of 211 hospital and 267 benevolent cases. There are also 6 benevolent asylums, with a total of 1974 patients; 7 orphan asylums, with 834 inmates—331 boarded out, and 148 in service. There is an infant asylum with 59 inmates; a blind asylum with 102; a deaf and dumb institution with 66; 4 female refuges; 2 convalescent homes, with 10 male, and 17 female beds. In addition, there are numerous benevolent dispensaries, private charities, nursing and maternity societies; Charity Organisation Society; and a Hospital Sunday Fund, which this year collected the large sum of £14,691 14s. 11d.

The actual results which follow from the hygienic conditions which have thus been described can, perhaps, be best illustrated by the presentment of the vital statistics, and expectancy of life, as compiled by recognised authorities.

Vital Statistics.—The following table is taken from Hayter's "Year Book" for 1888:—

Death-Rate at Various Ages in Different Countries.

Countries.	Number of Deaths per 1000 living at each Age.						
	Under 5.	5 to 10.	10 to 25.	25 to 45.	45 to 55.	55 to 65.	65 to 75.
Victoria	38·6	3·5	3·9	10·2	16·2	29·1	59·4
England	63·6	6·6	5·5	10·2	17·4	31·8	64·3
United States ..	58·8	10·1	5·4	10·8	17·6	27·2	51·4
France	75·6	9·2	8·8	12·7	16·6	28·3	66·3
Prussia	..	9·2	6·4	11·5	18·6	33·0	64·5
Austria	111·7	9·8	6·6	11·3	21·1	41·5	92·8
Switzerland ..	..	8.5	6·3	11·6	19·3	38·4	82·5
Italy	110·6	11·6	7·8	11·7	17·3	33·1	70·1
Spain	106·2	11·7	8·8	12·9	23·8	42·0	95·0
Belgium	68·1	12·7	8·1	12·9	19·0	32·3	74·5
Sweden	57·6	8·0	4·8	8·2	14·7	27·4	62·6

Expectancy of Life.—The following table is taken from a work just published by the Government Statist of New South Wales, and entitled, "The Wealth and Progress of New South Wales":—

Expectation of Life at Various Ages.

Age.	*New South Wales, Victoria, and Queensland		Healthy Males, A.M.P. Soc.	England.		Holland.		Belgium.		Sweden.		Saxony.	United States.
	M.	F.		M.	F.	M.	F.	M.	F.	M.	F.		
Birth ..	46·5	49·6	..	41·9	45·2	31·4	36·4	..	..	41·3	45·6	..	..
5 years ..	53·0	55·4	..	51·5	53·6	48·7	49·2	..	..	49·4	53 0	..	..
10 ,, ..	49·2	51·7	50·3	48·2	50·3	45·9	46·5	43·8	44·8	46·5	50·0	47·0	48·7
15 ,, ..	44·9	47·4	46·2	..	..	..	..	..	..	..	..	..	..
20 ,, ..	40·8	43·3	42·1	39·9	42·1	38·3	39·2	36·4	37·7	38·6	42·1	39 3	42·2
25 ,, ..	37·0	39·4	38·4	..	..	..	..	..	..	..	..	..	..
30 ,, ..	33·3	35·7	34·7	33·2	34·1	31·8	32·4	30·5	31·9	31·2	34·5	32·1	35·3
35 ,, ..	29·7	32·3	31·0	..	..	..	..	..	..	..	..	..	..
40 ,, ..	26·2	28·9	27·4	26·5	27·5	25·0	26·4	24·8	26·1	24·3	27·2	25·0	28·2
45 ,, ..	22·9	25·6	23·8	..	..	..	..	..	..	..	..	..	..
50 ,, ..	19·8	22·3	20·3	19·9	20·8	18·5	19·7	18·9	20·3	18·0	20·1	18·0	20·9
55 ,, ..	16·7	18·8	17·0	..	..	..	..	..	..	..	..	..	..
60 ,, ..	13·8	15·5	13·8	13·6	14·5	12·8	13·3	12·4	13·9	12·3	13·5	11·7	14·1
65 ,, ..	11·2	12·5	11·0	..	..	..	..	..	..	..	..	..	..
70 ,, ..	8·9	9·7	8·5	8 6	9·1	7·9	8·1	8·1	8·3	7·4	8·0	6·9	8 5
75 ,, ..	6·9	7·2	6·4	..	..	..	..	..	..	..	..	..	..
80 ,, ..	5·4	5·7	4·7	5·2	5·6	4·1	4·5	5·2	5·4	3·9	4·3	3·9	4·4
85 ,, ..	4·0	4·2	3·5	..	..	..	..	..	..	..	..	..	..
90 ,, ..	3·0	3·2	2·4	2.8	3·1	2·4	2·7	2·9	3·1	2·4	2·8	..	..

* *Vide* A. F. Burridge in "Journal of Institute of Actuaries," vol. xxiv.

Summary.

The following general statements will, in the opinion of the writer, be found to give a fair summary of the hygienic conditions of the Victorian people:—

The typical Victorian individual is healthy, but neurotic. He eats far too much meat, lives in a climate characterised by its variability, and generally wears clothing ill adapted to his surroundings. The result is that, upon his endowment, he is rapidly grafting a distinct hepatic tendency. This is accentuated by the fact, that if a drinker, he takes alcohol in greater quantity and more injurious form than the average Englishman. In his favour, however, it must be said that his hours of labour are light, and his social condition and general physical and mental environment such as should conduce to health. In his educational system, however, sufficient prominence is not given to certain fundamental moral elements. Taken as a member of a community, he would naturally enjoy an unusually long and healthy life, did he not allow himself to be surrounded by numerous preventile causes of disease. His water supply, in the country, is very frequently contaminated by the germs of hydatid disease; and, in the settled districts, it is becoming more and more liable to sewage pollution. It is when we look, however, to his surroundings as a citizen that we meet with the main factors of his corporate ill health. His household construction is frequently bad, his surface conservancy generally worse, and his system of drainage and sewerage always worst of all. Regarded

from a medico-legal point of view, he is found enjoying the benefit of more valuable legislation, perhaps, than is the case in any other colony; but, ineffective execution and municipal neglect, combine with individual apathy to deprive him of most of its beneficial results. After all, however, the fact remains, that the expectation of life and death-rate of the community, compare favourably with those of most other civilized countries, though they sink much below what might be reasonably expected.

In conclusion, a brief *resumé* of the main factors of Victorian disease may not be out of place. In thus giving an individual opinion, the usual terminology adopted on such occasions is discarded, partly because such classifications are always full of errors, but mainly because results and modes of death are therein discussed, rather than actual operative causes.

I venture, therefore, to advance the statement, that the main factors of Victorian disease are insanitary surroundings, hepatic vulnerability, and climatic variability. The extent to which these are present, may be gathered from the foregoing pages. The three are so interwoven in their operations, that their separation is frequently impossible. Giving them, however, a separate existence, it may perhaps be said with justice, that our insanitary surroundings are responsible for the wide extension of typhoid fever and diphtheria amongst us—not to particularise other less common forms of germ disorders—for the prevalence of hydatid disease, and an indescribable amount of general ill health, which assumes many local forms, and upon which the seeds of future disease of many kinds are found to flourish. Similarly, it may be said, that our hepatic vulnerability is responsible for all our liver complaints, for much of our circulatory, renal, and nervous disease, and for a large percentage of our rheumatism. Finally, to the extreme variability of our climate, we owe a vast quantity of respiratory disease, culminating in phthisis; a large proportion of our infant mortality, many diarrhœal and hepatic disorders, and the greater portion of our rheumatism. For all further information, as to the extent to which each separate form of disease prevails in our midst, the reader is referred to the reliable and exhaustive tables which formed the basis of Dr. MacLaurin's most valuable presidential address.

I cannot conclude without thanking Mr. Ellery, the Government Astronomer; Mr. Akehurst, the President of the Central Board of Health; Mr. Hayter, the Government Statist; Mr. Coghlan, the Government Statist of New South Wales; and Mr. Davidson, the Engineer of the Water Supply Department, for the very great assistance which they have afforded me in the collection of much statistical and other matter.

THE SANITARY CONDITION OF NEW ZEALAND.

By Leger Erson, L.R.C.P.

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The health and well being of the 600,000 people who are scattered over the wide area comprised under the general heading of New Zealand is, legislatively, under the control of "The Public Health Act of New Zealand, 1876." The machinery which is thus provided, comprises a Central Board of Health, Local Boards of Health, and Road and Highway Boards. The Central Board of Health consists of His Excellency the Governor, the Executive, a retired sea captain, and a medical man, who is also official visitor to the various hospitals and asylums of the colony. A Board so constituted, and so busied in many other important duties, cannot be expected to grapple, either energetically or successfully, with the great questions of State medicine. Still, it is as discreditable as it is surprising, to find how little work it has attempted. It has not sent an official communication to the Local Boards of Health for five years, and then only in the form of a few stereotyped questions regarding local sanitation, and without taking any action thereon, although incentives to such action were by no means lacking. The whole burden of the care of the public thus falls upon the Local Boards and Road Boards; the latter have jurisdiction only in places situated outside the corporate boundaries. Being unofficially advised, and largely composed of small farmers, elected from time to time to superintend such useful work as road-making, &c., they rarely take any steps to enforce sanitary precautions; and the utility of their functions does not deserve any serious discussion.

The health of the people is thus, practically, left in the hands of the Local Boards of Health, or in other words, the various Municipal bodies throughout the colony. The Auckland Borough Council, in its capacity as a Local Board of Health, is taken, as giving a typical example of this Municipal Health administration in New Zealand. The Sanitary Staff and Health Department, for this city of 60,000 people, comprises the City Councillors, a Medical Officer of Health, a Sanitary Engineer, an Inspector of Nuisances, scavengers, and a dog catcher. The drawbacks to constituting a city council a health committee, are everywhere those of committing health matters to those who are generally ignorant of the subject, without time to attend to its requirements, too easily removed from their office, and too likely to be influenced by personal or petty motives. These drawbacks, of course, are not absent in New Zealand. Again, that the Medical Officer of Health should be without a special qualification in State medicine, and allowed private practice in addition to his official duties, is a state of matters by no means confined to New Zealand—however desirable the opposite may be. But it is a great and additional disadvantage when, as with us, he should receive payment only when his services are asked for, and that his remuneration should be less than that enjoyed by a city scavenger. Further, as elsewhere throughout the colonies generally, our Inspectors of Nuisances are appointed rather for their general usefulness than for any approved

knowledge, or experience in sanitary matters. But nowhere else, perhaps, has that officer such an enormous amount of extraneous work as with us. It may amuse readers to know, that he includes the following amongst his duties:—Dog Registrar, Kerosene Inspector, Inspector of Hackney and other Carriages, Inspector of Lodging Houses, of Butchers' Shops, Prosecutor in cases of Breaches of the City Bye-laws, and Issuer of Licenses to Tram Drivers and Conductors. He has, also, to supervise the removal of nightsoil, the laying of dust, as well as attend to all correspondence, receive all reports on infectious diseases, and keep a return of the same. Can one wonder, if nuisances do accumulate somewhat, even when the inspector is most anxious and willing to remove them; and can one wonder, if infectious and other disease multiplies also, often to an alarming extent.

A striking example of how such a Health Committee may labour, in the presence of an epidemic, was given during last season, when the City Fathers, becoming alarmed at the results of sanitary neglect, actually stopped the publication of the health returns, under the pretext of preventing alarm. The public, however, became both alarmed and indignant, and the City Fathers fled to the local Medical Association, confessed their shortcomings, and asked for guidance.

After due investigation, we found that the whole system of sanitary administration was faulty, insufficient, and delusive; while possible sources of infection for the typhoid, then prevalent, were discovered in almost every municipal district. The main sewer was not properly ventilated, and discharged itself, close by the frozen meat works, into the harbour, almost adjoining the wharves. Abattoirs existed, full of abominations, not far from the source of the water supply. Human dwelling places were discovered, which only allowed for breathing purposes 250 cubic feet of air for each of the unfortunate people who occupied them; untrapped sewers; open side drains, with channels but seldom flushed. Dairies were reported reeking with poisonous exhalations, from befouled surroundings of decomposing animal or vegetable filth. Thus we have the eloquent fact, and I ask this Congress to note it, that the Municipality of the largest city in New Zealand admittedly confessed their inability to fulfil the duties assigned to them by the Act of 1876, as a Local Board of Health, and had, in their difficulty, to obtain the advice and guidance of a body of medical men.

The condition of affairs just recapitulated, so far as relates to the Northern capital, but reflects a similar unsatisfactory state in matters appertaining to the public health throughout the colony. Towns are laid out and built without due provision being made for sewerage and water supply. Transitions are gradually taking place from the hamlet to the village; the village to the town, and from the town to the city, without a thought being given as to the disastrous effects attendant upon an increasing population, when associated with the steady accumulation of insanitary surroundings. It, indeed, appears in many instances as if history would repeat itself, and that no awakening would take place until a succession of dire epidemics decimated and horrified a repentant and alarmed people. From all sides come requests for water supply, and waste pipes are placed in every direction, while the petitioners remain oblivious or careless of the fact, that if adequate sewerage be not provided at the same time, it were far better and safer

that the water supply had never been obtained; since the more sewerage is diluted, the more will it penetrate the soil, and unless let off in proper channels must increase decomposition, and ultimately poison the inhabitants. This will account for the apparent anomaly of some boroughs with no water supply, escaping typhoid; whilst others, who are so supplied, become infected. Independently altogether of the loss of valuable lives and of useful labour to the State, the aggregate cost to New Zealand, which has been attendant upon the absence of proper sanitary administration, must be enormous. One little epidemic cost an already impoverished Town Council a trifle of over £5000 for the care of typhoid victims within the borough.

The Seacliffe Asylum, which was built at a great cost to the country, had to be almost re-erected, to remedy defects in drainage, which threatened to make the building unfit for human habitation. In like manner, public buildings have been erected and are even now being erected, without proper sanitary inspection or supervision, with the inevitable result, that in a little time they will also be condemned, and upon an already burdened colony will fall the ultimate loss. I found Wellington insanitary, and zymotic diseases prevalent, and that in Dunedin no provision had been made for victims to infectious diseases, although many were reported; whilst the general hospital was built on what is known as made ground, and on principles now generally condemned for such institutions. I found, in Invercargill, the city laid out on a flat, but three feet above the level of the sea, whilst the wards of the local hospital were ill ventilated, and conveyed to the visitor a sensation of stifling. I found, at Napier, a swamp, which for want of proper drainage, periodically injured and endangered the health of the whole community. I found school-rooms so designed, that the rays of light struck the eyes of the pupils obliquely, from windows on the various sides of an octagon. I found public refuges, which upon measurement, allowed but 385 cubic feet of air for the breathing space of the unfortunate inmates, while everywhere, evidences were afforded of the want of proper sanitary supervision, and of the truths contained in the fact, that good drains and sewers will never be properly constructed until regularly organised Boards of Health have competent sanitary engineers and strict plumbing laws.

Now to the conclusion of the matter. It is useless to blame this or that for the spread of zymotic disease, when the whole system of sanitary administration is faulty, inefficient, and honeycombed by incompetency. Infinitely better to go at once to the root of the evil, and relieve Municipal Councils of duties they should never have undertaken. At present, the whole business seems to have a premium laid upon ignorance, since we know that these bodies are, with few exceptions, avoided by the best colonists as they would avoid leper-houses.

The sole Municipal control of the Public Health, as practically adopted in New Zealand, is but a relic of the old English system, which has long since been discarded in the mother country. It was swept away at the instance of Sir Charles Dilke and the English Local Government Board, with the happiest results; whilst the death-rate has since been lowered to a figure hitherto unknown in the United Kingdom. America also tried the sole Municipal control system, but there also it was attended with disastrous results, so it has been replaced by the

establishment, over the length and breadth of that continent, of State Boards of Health, which, being well organised and administered, have already achieved grand results, to the lasting benefit of the great American nation. Canada, in like manner, had a sole Municipal control of health system, to be again replaced by the provincial Boards of Health, which are now doing good work all over the Dominion.

It has been my privilege, Mr. President and Gentlemen, to have travelled in recent years over America, Canada, and many parts of Europe. I would, therefore, desire to bear testimony to the fact, that in no part of the world have I found sanitary administration attain a higher standard of efficiency, than in the Dominion of Canada. The system, therefore, which commends itself most to my judgment as the best for New Zealand, is a modification of the one adopted in Canada.

Since there are now engaged in the control of educational matters in New Zealand a Minister of Education, with a large number of School Boards, who are again further assisted by a larger contingent still of School Committees—and as the care of the Public Health is at least of equal importance to any country or people, I would, in like manner, suggest the establishing of a threefold cordon of sanitary administration throughout the colony.

The first line of defence against the ravages of preventible disease would be the creation of a Minister of Public Health. To him should be submitted, for final adjustment, any differences, when such may arise, between local and provincial Boards ; and he would be held responsible to the Parliament of the colony for the care of the Public Health.

The second (and, to my mind, the most important) line of defence would be the establishing of a Provincial Board of Health, consisting of seven members in each provincial district of the colony. They should be elected triennially; and amongst the members of the respective provincial Boards, there ought to be at least one medical man, a sanitary engineer, and one analytical chemist. Three members of each Provincial Board to be elected by the Governor-in-Council, and the remaining four by the Local Boards of Health, to be hereafter described. The powers of the Provincial Boards of Health to be analogous to those now exercised by the Central Board of Health of Victoria, and their relations to the Local Boards to be of a similar character.

The last line of defence would be the Local Boards of Health, one of which to be established in each town or district containing 4000 people and upwards. They should be elected solely for the purpose of attending to matters affecting the public health within their respective districts, whether directly or indirectly, and be guided in all large matters, such as water supply and sewage, by the Board of Health of their provincial district.

Such, briefly, is the scope and direction of these proposed measures of sanitary reform; measures which, I am convinced, are necessary and essential, not only to the well being of the people, but to the good name of the colony. Doubtless a minister may arise there, and declare as we have already heard here, that public opinion is not ripe for the changes indicated. Let the answer be to such political weaklings, that reform should ever precede, and not follow, public opinion. The cost attendant upon some of my proposals may also be objected to; but compared with

the great good that would follow their adoption, the outlay bears but little comparison, and would repay a hundred fold. New Zealand, once purged from the consequences of sanitary mal-administration, would shew a national longevity, hitherto unattained by any nation in any clime. Aided by her glorious climate and great natural advantages, this lovely country would then take the proud place which a bounteous Providence has apparently assigned to her lot, that of being the sanatorium of the Southern Hemisphere, and one of the gardens of the world.

In conclusion, let me add with Bryce, that if the voice of science be unanimous as to the necessity for sanitary measures being taken in the interests of the Public Health; if the more thoughtful and intelligent of the public are one in their opinion, as to the desirability of sanitary laws being passed; if foreign states press upon the country the urgency of international quarantine and sanitary legislation, for mutual benefit and protection; if statistics from the most civilised states of Europe and America incontestably prove the incalculable advantages to the State, from the annual saving of many lives, and of the expenditure of immense sums of unproductive capital in the treatment of disease and the burial of the dead; if thousands of homes, desolated by the scourge of epidemic diseases, and untold memories, sad and sorrowful at the thought of what might have been, had not pale death cast a sable pall over fair hopes blighted, and promises unfulfilled, are not to pass unheeded, then can the wisdom be doubted, the urgency questioned, or the necessity denied, of speedy, thorough, and extended measures being taken by the firm, yet not harsh, hands of the men who guide the ship of State in her appointed course towards the desired haven—the people's good. Can there be any doubt that the people of New Zealand are not only willing, but anxious, for reform in the direction indicated?

STATE MEDICINE IN WESTERN AUSTRALIA.

By J. R. M. Thomson, M.B. Melb.

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In order to render a series complete, I have written the following account of the legislative enactments in Western Australia with regard to medicine. The "Ordinance to Regulate the Registration of Medical Practitioners" was passed by the Legislative Council in 1869. By this act, provision is made for the registration of medical practitioners on production of diploma; but there is also a provision for the registration and licensing of persons who are not able to produce a diploma, if they are able to prove to the satisfaction of the Licensing Board that they are possessed of sufficient skill in medicine and surgery. There is also provision to punish persons who falsely represent themselves to be qualified. By the provisions of this Act, no unqualified person can recover fees for medical attendance in a court of law.

Other Acts relating to matters affecting the profession are those concerning lunatics, quarantine, vaccination, and public health. I shall treat of these *seriatim.*

The Lunacy Act is a copy, to all intents and purposes, of the ordinary enactments on this subject; it provides for the proper examination of persons alleged to be lunatics, by two medical practitioners, and the form of medical certificate is the same as in England and the colonies.

Quarantine is also the same as in other British communities; but there is a "Land Quarantine Act," by which, on the outbreak of infectious diseases, special regulations may be enforced to prevent the spread of infection, by isolating the house in which the disease occurs.

Vaccination at the age of three months is compulsory in Western Australia; and on account of the vast extent of the colony, provision is made by the Vaccination Act for vaccination in the more remote districts by appointing vaccinators occasionally to make special journeys into the country. Inoculation with small-pox virus is an offence punishable by fine and imprisonment.

The Public Health Act is a recent one. It provides for the appointment of a Central Board of Health, and of Local Boards in the principal towns of the colony, and such other places as may be recommended by the Central Board. These Local Boards have everything to do with sanitation, and their officers are empowered to secure the punishment of offenders.

SEWAGE DISPOSAL.

By W. F. Taylor, M.D.

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Judging from the present insanitary condition of many of the cities and towns of these colonies, the subject of sewage disposal does not appear to have been fully understood by the various local sanitary authorities. In the following remarks I shall endeavour to detail, as briefly as possible, the result of my investigations with regard to this very important matter:—

The removal of excreta by water is the cleanest, most convenient, quickest, and cheapest method in all cases where a public water supply exists. Sir Joseph Bazelgette says:—"There are few who will not now recognise that the removal of the refuse of large towns by water, is so vastly superior to any other known method, as to have caused it to be an essential in these days of civilisation and refinement."

As channels must necessarily be made for the conveyance of the water used for baths and other domestic purposes, such as washing, cooking, &c., some urine, and trade products, they can be used with little alteration

for the removal of excreta also. This does not apply, however, to such cities or towns where the system of surface sewerage pertains; where the water tables of the streets are made to do the duty of sewers, and house drains are not the rule, but the disposal of slop water, by throwing it on the ground at the back of the kitchen, the almost general practice. In such places immediate sewering, with proper house drains, is a crying necessity for the disposal of the slop water, whether the excreta be intercepted or not. And as, in such places, provision is usually made for the removal of the rainfall by means of these water tables and underground conduits, the sewage could be dealt with on the separate system, the advantages of which are fully recognised by all those who have given the subject any consideration.

On the question of separating the sewage from the rainfall, the evidence given before the Royal Commission on Metropolitan Sewage Discharge, which sat from July 1882, to October 1884, is pretty conclusive. Sir Robert Rawlinson says:—"If you had to begin at the beginning and sewer London *de novo*, the Fleet Ditch should not be a sewer; the Ranelagh River should not be a sewer; all the valley lines should not be sewers. They should have been surface water channels alone, and the sewage should have been intercepted on both sides, and carried into the main outlets which are now provided." Mr. Bailey Denton says, in his work of 1880:—"Experience has established the fact, that no mode of cleansing sewage by tank treatment, or by irrigation over, or filtration through, land, can be effective when the sewage is diluted by rainfall beyond a certain amount. It is easy enough to deal with an outflow from sewers, if the quantity be constant, and is ascertained, but it is quite beyond the powers of any engineer to devise a means of treating liquids swollen by sudden and extraordinary dilution." Colonel Jones also, very experienced in sewage treatment, says:—"The Town Council of Wrexham have found it possible to meet my views, by a very inexpensive diversion of surface water from its former course (of admission into the sewers), direct into a river which intersects the whole length of the town."

The Commissioners express the following opinion, in referring to the sewage of London:—"We consider, however, that this is a matter of much importance as regards the future disposal of the sewage, in whatever way this disposal may be effected. If it is to be used on the land, or treated chemically, its concentration and uniformity are highly desirable; and if it is to be carried further away by a long conduit, its volume should, from motives of economy, be reduced to a minimum. For these reasons, the separation ought to be effected as much as possible in future extensions of the drainage. We are glad to see that the Metropolitan Board are alive to the necessity of this measure."

Sir Joseph Bazelgette says:—"To carry out such a scheme as I am suggesting, or any scheme suitable for those districts (the valley of the lower Thames), it would be necessary to separate the sewage from the rainfall. The areas are so large, and the quantity of sewage so small, that it would be impossible to take them together; they must be taken separately."

Dr. Alfred Ludlow Carroll, formerly Secretary to the State Board of Health of New York, wrote me as follows:—"We have had in many parts of the country a very satisfactory experience of the

"separate system" of sewerage, wherever it is possible (as it is in most cases) to carry off surface water by surface grades. The modification in construction upon which the success of these chiefly depends, consists in the frequent and thorough flushing of them by means of automatic flushing tanks (usually Field's syphon), discharging from 120 to 140 gallons at intervals of from eight to twelve hours. A 6-inch vitrified earthenware pipe will carry the sewage of a considerable population (over 400,000 gallons per diem, with a grade of fifty feet to the mile), and is kept free from filth accumulations by the intermittent flushing."

This system has been in operation in Memphis (where it was first tried), Keene, New Brighton, Rockaway, and other places, for some years, and so far as I can learn, has answered remarkably well, being comparatively cheap and easily worked. A complete description of the practical working of it has been furnished by Mr. Horace Andrews, C.E., in a report to the "Chairman of Committee on Drainage, Sewage, and Topography, Albany. It is the invention of Mr. George E. Waring, C.E., who has recently written me to the effect that the system has been much improved of late, and is being applied to many different places in America.

The "separate system" appears to me to meet the requirements of this country much more satisfactorily than any "combined system." For in the case of the latter, the conduits must be made of large size, to carry off the sudden and great rainfall which so frequently occurs; and these, during periods of dry weather, would only have a small stream of sewage flowing through them, which, if undergoing decomposition, would fill them with noxious gases; whereas, in the case of the former system, the pipes would never be less than half full of sewage, would be well ventilated by the means which Mr. Waring has adopted, of carrying the soil pipes above the roofs of the houses, and doing away with any disconnection between house drain and street sewer, and would be efficiently flushed as often as necessary by the automatic flushing tanks.

The disadvantages of a separate system are—that separate channels and pipes have to be provided for the rain; that the rain from all large cities carries from roofs and streets much organic débris, which pollutes the river or watercourse into which it may be discharged. But with a single system the drains require to be much larger, and storm overflows must be provided, sufficient to carry off the storm water when the drains get filled, and with this storm water the whole contents of the sewers are discharged, so the stream would run greater risk of being polluted in this way, than if the surface water only were allowed to flow into it. However, the second objection to the separate system has been done away with by an ingenious contrivance of Mr. Horace Andrews, by means of which the first portions of rain water (containing the foulest parts of the street washings, &c.), may be intercepted, and be thus prevented from polluting any watercourse into which they would otherwise run. It consists in placing an intercepting drain at a lower level than the conduit for rainwater, and so arranged that the contents of the conduit will flow into it until they increase in volume and rapidity sufficiently to shoot over the drain, by which time they are comparatively pure.

In a paper on "American Sanitation," by John B. Gass, A.R.I.Bd., read at the Congress of the Sanitary Institute of Great Britain, held at

York in September 1886, he says :—"Memphis is the best known and largest example of the application of the result of the investigations in various cities, by order of the United States National Board of Health. In these cities, the main sewers were gauged to determine the actual size of pipes needed for the removal of the greatest amount of foul sewage matter only, produced under various circumstances. These gaugings show conclusively that for foul sewage matter for a large population, main drains of only small diameter are necessary.

Colonel Waring, of Newport, R.I., the engineer who designed the Memphis sewage scheme, communicated a paper to the Sanitary Institute, in September 1880, giving a full account of this work :—"It has now been in use over four years, and the practical working appears to have been very satisfactory. To recall the main features, I may say that Memphis is a city on the Mississippi, of between forty and fifty thousand inhabitants. The main drainage system is for foul sewage only, and when complete, will have a total length of about forty miles. There being very few cellars, and the ground having a good natural fall, the drains were laid about six feet deep. No outlet drain from any house was allowed more than four inches in diameter, the tributary mains being eight inches and six inches in diameter, and the two mains commencing from eight inches diameter and increasing to twelve inches and fifteen inches diameter, all being of socketted glazed pipes. The two mains are joined together into a twenty-inch brick sewer, which has switches turning the drainage into a three-foot iron pipe for the high water outlet, and into a twenty-inch iron pipe for the low water outlet—the extreme variation in the river being thirty-five feet. On the main lines, man-holes have been put in at intervals. No house connection is trapped, but each has an unobstructed ventilator reaching to top of roof ; this gives vent to about thirty feet of sewer. Every slop stone, water-closet, sink, &c., has an independent trap ; hopper closets are insisted on ; the sanitary regulations are very strict ; and all plumbing work is inspected by engineers. The whole system is flushed daily or half daily with about one hundred and fifty Rogers Field's well-known automatic flush tanks, supplied with town water, and placed at the dead end of every branch, to thoroughly flush each length ; each flush tank discharging one hundred gallons in forty seconds, thoroughly scours the pipes. The subsoil drainage is by agricultural drain tiles one inch to three inches in diameter, laid beside sewer, and in the same trench ; these discharge into the nearest watercourse, or, on very level ground, into the main sewer, with special precautions against sewer water backing up. Storm water is removed by surface gutters, with outlets through shallow conduits, easily accessible."

On this system, there have been official reports by Mr. Gardiner, for the Board of Health, New York State ; and Mr. W. H. Baldwin, C.E., the latter dated March 29, 1884. The following is a summary of these reports, with regard to the working:—"In the mains, from ten inches and over, a deposit is found of fine silt, supposed to be mud and paper pulp; this is cleaned out about once a month, by rope and steel brush being dragged through from man-hole to man-hole. In the lateral sewers, there are very few stoppages; when stoppages occur, they are from schools or shops only, and in pipes six inches in diameter and under, and are

caused by sticks or pieces of metal getting crosswise in the pipes. For stable washings, catch pits have been found necessary. A few T cleaning pipes have been inserted, and hand holes are now put in all extensions 100 feet apart. Some of the sewers are 2000 feet from the mains, and the longest lines generally run about a quarter full. Overflows have had to be provided, for taking the water in winter, when the water taps are left running in the houses to prevent them freezing. Neither in removing obstructions, in cleansing the main sewers, nor in connecting with house drains, is the odour of sewer gas ever observed. This system was adopted at Keene, N.H., and executed in 1882-3. I am informed that it is working well, though the greatest fall is only four inches in 100 feet, and the lowest fall being $\frac{1}{10}$ inches in 100 feet, and that line nearly two miles long. It is also being used in parts of Paris and other places, and may, I think, on a large scale, be considered a success."

The "separate system" offers a very great advantage over the single or combined system, in places where the sewage has to be raised to a higher from a low level; the quantity being nearly uniform, the pumping machinery could be easily regulated to meet all requirements. Mr. Isaac Shone's system of pneumatic ejectors would, however, in many cases answer this purpose better than pumping. It consists in forcing the sewage, by means of compressed air from iron tanks, termed ejectors. At a central station an engine is placed, which forces air under a pressure of sixty five pounds to the square inch, into air compressors, consisting of large vessels made of boiler plate iron. From these, pipes lead to the ejectors, which may be placed at different points of the town; the distance at which they are placed from the central station being practically of no importance, as it is said, very little loss of power ensues, no matter how long the pipe may be. The ejectors are iron vessels of about 600 gallons capacity, having an inlet for the sewage which flows into them by gravitation, and an outlet for the discharge. When the ejector is full, the compressed air is admitted by an automatic arrangement, which opens the valve of the air pipe, and shuts it again when the ejector is emptied. A ball valve prevents the sewage being forced back into the sewer. The height to which sewage or water can be lifted by this means is practically unlimited. The town can be completely sewered on this principle, ejectors being placed at certain cross streets to receive the sewage of a number of houses, the sewage being forced into and along air-tight main sewers to the outfall. At Eastbourne there are seven pneumatic ejectors, which are supplied with compressed air from one station, one ejector being about two miles from the station. The cost of working the system at Eastbourne, the sewage of which is entirely managed by it, is £600 per annum; the total cost of plant, land, houses, &c., being £8500. Eastbourne is, for the most part, about twelve feet below the level of high water, yet the low lying part is as well and efficiently drained by this system as the higher parts are by gravitation, the sewage being lifted sufficiently high to flow by gravitation into the sea. The mains being air-tight, there is no danger of sewer gas escaping.

The disposal of sewage at the outfall is a matter of serious consideration, and the method must differ with the position and other circumstances of the place. When possible, it should be discharged directly

into the sea, its manurial value being less than the cost of applying it to land. Its value as a manure may be gathered from the fact that, in 100 tons of sewage of average quality, the suspended matters are worth 2s., and the matter in solution, 15s. = 17s. in all, or about 2d. per ton theoretical value, or less than $\frac{1}{3}$ of a penny actual value. Sir R. Rawlinson says :—"Sewage, to have value, must have certain natural facilities, such as cheap land and a free outlet to the sea. If the sewage of London is to be valued (at what it is worth) all the year round, you could not put more than $\frac{1}{2}$ a penny to a ton on it." Dr. Meymott Tidy says :—"The local authorities always will get it into their heads that they ought to make their sewage pay, whereas sewage is a great ugly thing that one has to spend money on to prevent its being a trouble and a cause of nuisance." Sir Frederick Abel, C.B., says :—"That it is impossible to deal with sewage in reference to its manurial value. The only real method of disposing of sewage is to carry it out to sea."

In considering the question of disposal of the sewage of any place, that plan should be adopted which will be the least costly and most efficient—*i.e.*, efficiency and cheapness should be solely considered, and all idea of utilisation for manurial purposes dismissed.

Storage in Tank with an Overflow.

The sewer water runs into a cemented tank with an overflow pipe ; the solids subside, and are removed from time to time ; the liquid is allowed to run away, either into a ditch or stream, or is conducted in drain-pipes half to one foot under ground, and escapes into the subsoil, where it will be readily absorbed by the roots of grasses. The fat, grease, and coarser solids, may be intercepted by a strainer, and the liquid portion may be discharged automatically by means of a flush tank (Field's). The plan is only adapted for a small scale, and when the soil is light. It may be used for a single house, or a small village, for the slop water, even where the excreta are removed by the dry method. The tank should be ventilated by a shaft leading up a tree, and there should be a well-ventilated disconnecting gully between the house-pipe and sewer.

Discharge at once into Running Water.

All new works of this kind are prohibited in Great Britain, and the tendency is to do away with the plan altogether. The injury to rivers by turning sewage into them is of three kinds :—(1) Sediment which forms banks of mud ; (2) destruction of fish (fish will live in fresh sewage, but not in stale) ; and (3) emanations into the air of gases.

Precipitation.

The solid part of the sewage is precipitated before the liquid is allowed to pass into the stream, or over the land. This is sometimes done by subsidence, the sewage being made to pass through strainers into a settling tank ; but usually, some chemical precipitant is also used. A variety of substances have been employed as precipitants, such as lime, salts, albuminous substances, charcoal, alum, blood, clay, charcoal, manganese, &c. ; the A.B.C. process—perchloride of iron, sulphate of zinc, permanganate of soda, &c., and the effluent is more or less

satisfactory. Mr. Dibdin (consulting chemist to the Metropolitan Board of Works), maintains however, that the dissolved organic matter is not affected to any appreciable extent by chemical treatment, the sewage being merely clarified, the clearness of the effluent, *i.e.*, the degree of removal of the suspended matter being dependent on the quantity of of such chemicals used.

Chiswick offers an example of the chemical treatment of sewage, without any subsequent filtration through land, the effluent being rendered sufficiently pure to permit of its discharge direct from the settling tanks into the River Thames, above London. Lime and alum are the chemicals used, in the proportion of 11 grains of the former, to 7 grains of the latter per gallon. The lime is first mixed with the sewage by means of a revolving mixer, and the sewage passes into the pump-well, and then has a run of 300 feet before it is mixed with the alum. It is then run into tanks and allowed to precipitate for three hours, and the effluent run off into the river. The sludge is turned into a small tank at the rear of the sludge-press shed, and is then passed through a Tobinson's pneumatic sludge-press, which turns out 24 cakes, of 54lbs. each at a time, a bag of slacked lime being added to each lot. The sludge cakes are sold as a manure at 1s. 6d. per ton.

"Broad irrigation means," says Mr. Edward Pritchard, "the application of a minimum quantity of sewage upon a maximum area of land, by which we obtain the greatest amount of utilisation combined with purification, that enables the crops to be grown upon the land, at the same time that the sewage is treated, and the land purified." The land is cropped principally with Italian rye grass, but root crops, such as mangolds, turnips, &c , are also grown. The sewage water passes over and through the soil, and is thus brought under the influence of growing plants, a very good clean effluent being the usual result in the case of well-managed farms.

When the sewer water passes through the soil, there occurs—First, a mechanical arrest of suspended matters; second, nitrification.—Dr. Thomas Stevenson says:—"There is no agent which so efficiently deodorises sewage as the soil, which acts not only as a checker of putrefaction, but also absorbs the gases of sewage; and further, is the nidus of the well nigh demonstrated nitrifying agents—*i.e.*, the bacterial organism by which ammonia and nitrogenous organic matter, immediately, or through the intermediate stage of ammonia, are converted into nitrates." Third, chemical interchanges.—The soil requires to be deeply ploughed, or dug with a spade, and otherwise properly prepared. In the case of a light soil, ploughing will probably be sufficient; but in clay soil, underground drainage, and the application of ashes or ballast (burnt clay) may be necessary. The land should have a gradual slope, and be levelled of all its irregularities. The sewage is allowed to flow into main carriers constructed of concrete, earthenware, or trenches dug into the ground, and from these it is carried by subsidiary carriers to different parts of the land. By a simple arrangement, any carrier may be blocked, and the sewage allowed to flow on to the ground below, and thus its distribution may be regulated. The heavier suspended matters in the sewage are usually removed by passing it through strainers and subsidence tanks, the sludge being removed, and dug into the ground. By proper attention to detail, a sewage farm may be managed

so as to be free from disagreeable odours, and any danger to health. At some farms, the sewage is chemically treated, to increase the precipitation of the suspended matters.

Sir Robert Rawlinson, C.B., stated before the Royal Commission referred to—"That in Doncaster 1,000,000 gallons of sewage per day were put on the surface of the ground, and that no effluent could be seen. And also in Bedford, the same quantity was put in sandy soil, with a similar result. They have discountenanced the use of tanks at Doncaster, the sewage being pumped directly into the carriers." Examples of the treatment of sewage by "broad irrigation" are to be found at Croydon—the Beddington Farm, consisting of between five and six hundred acres, receives the sewage of a population of 60,000; South Norwood, with an area of sixty acres, receives the sewage from 12,000 people; and Tunbridge Wells, which has a population of 26,000, and the sewage of which is disposed of by two farms of 205 and 125 acres respectively.

On the subject of Broad Irrigation, the Commissioners alluded to, state :—

(1) That generally speaking, it offers a satisfactory mode of disposal of town sewage, when circumstances admit of its application.

(2) That it offers the most likely means of realising some portion of the value of the sewage.

(3) That when properly arranged, and carefully conducted, the effluent will be effectually purified; but that under careless management, the purification will be incomplete.

(4) That it need cause no danger to health.

(5) That with proper care, when applied on a moderate scale, it need cause no serious nuisance to the surrounding neighbourhood; but that if improperly managed, nuisance may arise, and may become considerable.

(6) That there may be a danger of the pollution of subsoil waters.

Intermittent Filtration.

The Croyden Rural Sanitary Authority dispose of the sewage from a population of 21,000, by filtering it through a filter-bed consisting of twenty-eight acres. The ground is underdrained to a depth of from four to six feet. The drains are twenty feet apart, and consist of six-inch socketed pipes. Grass is grown on the filter-bed. Irrigation may be combined with filtration, and chemical precipitation may be combined with either, or with both.

In a paper on the "Sheffield Corporation Sewage Works," read by Mr. John Merrill, at the Congress of the Sanitary Institute of Great Britain, in September 1886, he gives the following description of the intermittent system of precipitation as in operation at Bradford and Sheffield :—

"The works cover about seven and a half acres, and consist of a main building and thirty tanks, each having a capacity of 50,000 gallons, together with an oxidising weir and two filters to each tank. The process may be said to consist of four parts or sub-processes—subsidence, precipitation, oxidation, and filtration.

"The sewage enters the works, and flows through four deep subsiding tanks; these act also as catch-pits, as well as separating the heavier

solids contained in the sewage. The reasons for this separation of the heavier solids are threefold :—Firstly, the heavier solids form a compost which can be readily and easily got rid of; secondly, the quantity of sludge from the precipitating tanks is thereby reduced; and thirdly, the separation of the heavier from the lighter solids abolishes all nuisance in the drying.

"From the subsiding tanks, the sewage flows forward under the main building, and receives the milk of lime. It then flows through a conveying channel, which serves also as a mixing chamber, where by a beautifully simple and ingenious arrangement, the lime is most thoroughly mixed with the sewage without the use of any machinery whatever. So intimate is this mixture, that the quantity of lime has been reduced from one ton per million gallons to fourteen cwt., a saving of about one-third. The sewage is then admitted into the precipitating tanks, which are the most important feature of this process (first introduced by M. Alsing at Bradford), and from which it takes its name of "intermittent precipitation."

"As soon as a tank is full, the flow is shut off, and the sewage allowed to remain completely at rest. The advantages of this method of treatment are very great; by it, we are able to get rid of every trace of solid matter, which cannot be done when a constant flow is maintained.

"In the Sheffield Works, twenty-five minutes after a tank is filled, complete precipitation has taken place, and the clarified sewage is as bright, clear, and colourless as spring water, and contains not a trace of solid matter."

The next feature of the works is one entirely novel, namely, the oxidation of the effluent. Oxygen is the great purifier, and to quote the Glasgow report—"If an effluent is brought into contact with oxygen, either by churning it up with air, or passing it over numerous falls, or exposing it in a thin stratum to the air, it speedily becomes inodorous, and no longer putrescable."

The problem, however, has been solved in the Sheffield works, by the establishment of weirs—one to each tank. The clarified sewage runs from the tanks in a very thin stream over a weir, with a slight fall, exposing a very large surface to the air. From the weirs, the sewage runs through two filters, downward and upward. The filters are so constructed that, after a tank is run off, the filters used can be completely emptied of liquid, and allowed a period of rest, so that the filtering material becomes re-charged with oxygen. The sludge runs by gravity from the tanks into a collector, from whence it is pumped into open air drying ponds. These ponds are placed at a higher level than the tanks, consequently, the supernatant liquid can be run back into the tanks, and treated over again.

Mr. Merrill sums up the advantages of the intermittent system to be —"Simplicity, great efficiency, small tank area required, economy of both construction and in working—cost of Sheffield works £32,000, and working expenses about £5000 a year."

The solid excreta appear to be a great bugbear to most local authorities; but their admission into the ordinary sewage does not chemically affect it, as it is well ascertained that the sewage of a non-water-closeted town does not differ chemically from that of a water-closeted one. Dr. Thomas Stevenson has stated that the composition of sewage varied

much less than might be expected, and the difference was one rather of degree than of kind; that there was little difference between the sewage of a water-closeted town and a non-water-closeted town (see *Lancet*, May 9, 1885).

The average amount per head per diem of moist excreta is, in Europe, 2½ ounces, equal to 1 ounce dry; which, if added to 30 gallons of water —the average water-supply per head per diem of London—would represent an addition of only 15 grains of solid matter to the gallon—*i.e.*, 15 grains to 10 lbs.—a mere fraction. Some provision must be made for carrying off the urine, which amounts to an average of 40 to 50 ounces per head per diem; and as we now know that the bacilli of typhoid fever are to be found in the urine, it is not so innocuous as hitherto supposed.

From the foregoing, it is apparent that no valid reasons exist for intercepting the solid excreta from ordinary sewage. All intercepting methods fail more or less in effecting their object. They are expensive, and contribute, in a great measure, to engender those habits of constipation, which are so common among such a large section of the female population of non-water-closeted towns.

LEPROSY: IN ITS RELATION TO THE EUROPEAN POPULATION OF AUSTRALIA.

By John M. Creed, L.R.C.P., M.R.C.S.

Member of the Legislative Council of New South Wales.

It is not my intention, nor do I think it will be the desire of the Members of the Congress, that I should enter very deeply in this paper into the pathology and symptoms of leprosy, my object being to point out in a concise mode, the amount of danger to which a community such as that of these Colonies is exposed, by the presence in it of the few lepers which are now here. I think that only good can follow an attempt to point out how comparatively ungrounded is the unreasoning terror in which this disease is held by most non-professional persons, and to show that the danger of infection is comparatively trifling.

I do not, however, for a moment wish it to be understood, that I do not think the disease a terrible one for its unhappy victims when once infected. Leprosy may affect any portion of the body. It is essentially a constitutional disorder, indicative of a cachexia, or depressed condition of the general system. Its outward manifestation occurs in three forms —the tuberculated, the maculated, and the anæsthetic. One, or all, may be present in the same subject at the same time. In lepra maculosa, the first symptoms are the appearance on the skin of spots varying in size, having an area of from half a square inch, to five square inches or more. At first the colour is light red, disappearing on pressure. This by degrees gets darker, gradually increasing in intensity until it becomes

a dark brown. The surface of the spot is shining and smooth, and the skin feels like fine velvet. The latter characteristic, Hebra considered absolutely diagnostic. The affected part is not much elevated, but between the fingers the skin feels hardened and thickened, and is sometimes very sensitive. The spots are generally situated on the trunk and limbs. They grow peripherically, the centre turning into yellow brown, while the fresh outer portion is red and slightly swollen. They never perspire. The whole spot may disappear.

In lepra tuberculosa, the nodules may grow out of the spots of the last form, or they may appear independently, they may vary in size from a shot to a walnut, they generally first appear on the face, and are almost always in the greatest proportion on this part. The face is broadened, puffed, and brown or red in colour. On the tubercles, the hair is thin or completely lost. The nose is generally thickened, and as well as the lips, covered with knots. The lobes of the ears are converted into thick, rugged masses. The tubercles may appear on all parts of the body and limbs. Next to the face, however, the hands and feet show the most striking appearance ; they become deformed ; the digits are enlarged, especially at the tips, and are frequently kept apart by their thickened extremities ; the joints become stiff and often immovable. The knots may atrophy, be re-absorbed, or turn into abscesses and ulcerations. Destruction of the tissues sets in, and portions of the hands or feet may be spontaneously amputated, and death ensue after some years, according to Drs. Danielssen and Bœck, on an average in about nine or ten, though many patients live for many years, and occasionally life is prolonged to old age. Lepers, however, do not usually die directly of leprosy, but of diarrhœa or dysentery, of inflammation of the lungs or air passages, or of disease of the kidneys. In these varieties of leprosy, neuralgia is said to be a special symptom ; but leprous neuralgia seems to be limited to the ulnar nerve, a little above the inner condyle of the humerus ; to the auricularis magnus nerve on the sterno-mastoid muscle, and to the posterior tibial nerve along its course ; but the ulnar nerve is attacked by this neuralgia most frequently and most severely. These nerves may be felt even in the early stages of the disease, when there is no neuralgia, to have assumed a tense cord-like character. Marked changes have been noted on post-mortem examination in the nerves of lepers, by Drs. Danielssen and Bœck of Norway, and Dr. Carter of Bombay, the latter's more exact observations confirming those of the former.

The third form, lepra anæsthetica, is, as a rule, associated with one or both of the others, but it may occur alone. When it is the original form, large vesicles first appear on the skin, which will, probably, be mistaken for pemphigus, and for a time the sensibility of the skin remains normal, but subsequently, the seats of the vesicles lose all feeling. The anæsthetic spots may appear on an otherwise apparently healthy skin, so that patients first gain a knowledge of it by medical examination, or by the painless result of some accident, for they may burn, scald, or cut themselves without being conscious of it, except from seeing the thing happen. This insensibility is not confined to the skin, but extends to the deeper tissues beneath the anæsthetic spots.

The disease may make its appearance at any period of life, even in early childhood, but from the age of puberty to that of maturity is the

more general time of its incidence. Until the discovery of the bacillus of leprosy, those observers who had the best means of judging, with few exceptions, were of opinion that the disease was non-contagious; and the numerous examples given, of continued intimate association for years, even as husband and wife, by healthy persons with lepers, without the transmission of the disease, gave such support to this view that it was practically incontestable. The presence of this specific germ, however, gives such support to the opinions of those who believe that it is contagious, that I think probability is in accordance with this view. At the same time, the difficulty of transmission is so great, excepting under circumstances extremely favourable to the development of the disease, that there is but little danger of infection to the white population of these colonies. The long period of incubation, often many years, renders it the more difficult to decide this question positively. A case is quoted from Borneo, in which a boy, having thrust a knife into an anæsthetic spot of a leprous child, afterwards incised with it his own thigh. He had no further dealings with lepers, but nineteen years afterwards developed the disease. Dr. Massanao Goto, a Japanese physician educated in European medicine, stated in his graduation thesis at the Cooper Medical College in San Francisco, that, by the permission of the Hawaian Government, an attempt was made to reproduce leprosy in a convict, by inoculation with leprous matter, but that two years afterwards he had developed no signs of the disease. According to the same gentleman, who was practising in the Sandwich Islands, and paid great attention to leprosy, the disease was unknown there until 1859, when it first occurred in the persons of two Chinese coolies; but in 1884 there were upwards of 1200 lepers, about 1·5 per cent. of the population in this group of islands; 721 of whom were, in that year, confined in the leper settlement of Molokai, and 186 in a branch hospital in the suburbs of Honolulu. About 300 more were met with by him in his private practice, who were not under Government supervision.

In view of the fact that, in twenty-five years, the disease manifested itself in 1·5 per cent. of the population, it is impossible to deny that it must be communicable by contagion or infection; but when this is considered, it must be borne in mind how extremely favourable for the development of the disease are the conditions of life of these people. In the Report of the Committee on Leprosy, of the Royal College of Physicians, are given a number of instances, by various observers in all parts of the world, of the most intimate relations having existed for years between healthy persons and others suffering from the disease, without its being communicated. Dr. Goto made careful inquiry as to hereditary transmission in leprosy, and succeeded in collecting sufficient data in Japan to show that the disease occurs from hereditary transmission in about fifty per cent. of cases. Leprosy, when inherited from the mother, is more severe than when inherited from the father; and is more severe when inherited from both parents, than from one alone. The disease may skip a generation or more, to re-appear in later descendants, who have it in a milder form. This physician, as well as other observers, are of opinion that the presence of constitutional syphilis increases the susceptibility to leprosy, and that in those cases in which hereditary leprosy is latent in an individual, the infection of

syphilis will bring it into activity. He claims considerable success in the treatment of the disease, and is said to have cured several cases. The *Japanese Mail* says—"Dr. Arai Saku, a Japanese practitioner, who has charge of the Shusai Hospital, has been most successful in treating cases of leprosy amongst his countrymen. It is said that this was made known to the Indian Government, and resulted in their writing to Dr. Arai Saku, to invite him to go over to India, and there try his hand on confirmed cases." It must not be forgotten, that the practice of medicine in Japan is of the most advanced European type, and that its conduct is regulated by Imperial decree as to study and qualification for practice, far in advance of the regulations in these colonies.

The disease is found in all parts of the world, and under the most diverse circumstances of climate, latitude, and mode of life but in every place where it is present, the conditions of life of the people are such as to lower vitality. It is found so far from the equator as 70° north, and in such cold countries as Iceland, Norway, the Baltic provinces of Russia, and New Brunswick; but it is perhaps more prevalent in the warmer climates, and in damp, low-lying situations. In the middle ages it was common in all the countries of Europe, including Great Britain and Ireland, in which latter country it was prevalent until the close of the seventeenth century. The disappearance of the disease in the countries of a higher civilisation, is accounted for by the vast improvement which has taken place in the food and dwellings of the people during the last two or three centuries. Prior to this, for at least six months of the year, the entire animal food of the population consisted of salt meat or fish, often in a semi-putrid state; whilst wheaten bread was an unknown luxury to the majority, and fresh vegetables were unprocurable, except in the summer months. The dwellings were unventilated and often filthy in the extreme, the rushes or straw with which the floors were strewed being frequently left until they were rotten before removal—this insanitary condition being added to by the débris of food dropped or thrown down by persons eating. Personal cleanliness was almost an unknown thing in those days, no greater proof of which can be advanced than the curious fact brought into prominence by "Saint Beuve," in a review of the diaries of the physicians of Louis XIV. of France. Of this monarch it is recorded, that after childhood he took but one bath, which he found so distasteful, that he vowed he would never take another; and it is believed he kept his word. When such a thing is recorded of so great a personage—the head of the most refined court of Europe at a comparatively late period—what must have been the condition of the lower classes during the time in which leprosy was prevalent on that continent. Even in the great houses, men slept on straw in the large hall, often with a common covering; whilst clothes were made of such lasting material, and were so passed from one to another, as must have greatly aided the transmission of disease of all kinds. These clothes it must be remembered were worn, by at all events the lower classes, without body-linen.

As to the conditions under which leprosy exists in these times, we have the fullest information in the answers to the interrogatories put by the Committee of the College of Physicians, of London, who made inquiry some twenty-five years since. Almost without exception, the answers show that the disease rarely attacked any but persons living

under conditions of the most insanitary kind; and that in the majority of instances, it showed the greatest activity where the diet consisted principally of salt fish, often semi-putrescent, with dry vegetable food, mainly consisting of inferior and damaged grain; and that in those places where the patients had had a fair supply of fresh meat, there had been a complete absence of fresh vegetables.

In Hawaia, where the spread of the disease has been more rapid than anywhere else, the staple diet is chiefly vegetable, with fish; the former is generally prepared so as to be in a fermented or even partially putrid state before being eaten. Dr. Thomson, surgeon to the 58th Regiment in 1853, accounted for the presence of leprosy amongst the Maories by their neglect of personal cleanliness, and their fondness for putrid vegetable food. He says that the disease was more common just in proportion to the fondness of the people for this kind of diet. He remarks that "since the improvement in the condition of the New Zealanders by intercourse with Europeans, the disease is becoming rare."

In Australia, in 1865, there were no known lepers, except in Victoria, which at that time had thirteen. To the present time, there have been none known in South Australia or Tasmania, and the number has decreased in Victoria to five, but there are now ten in New South Wales, and several in Queensland—the exact number I have been unable to ascertain from the health authorities of that colony. The lepers in the older colonies are all Chinese immigrants, with two exceptions—one of whom is a Malay, a native of Java; the other a young European, aged twenty-seven, born in Sydney. The latter is, as far as I can ascertain, the only instance of a white leper known in Australasia, except the young daughter of a British official in a South Sea island. His is a well-marked case of the tuberculated variety, but little information can be obtained from him as to the probable source of his disease. He, however, denies all intimate association with the Chinese.

To summarise, I submit we may fairly assume:—

(1) That the disease is contagious, but only under circumstances (extremely favourable to its propagation) which lower the vital powers of the persons exposed to it; and that there is no real danger to persons who live with good sanitary surroundings, have a fitting, wholesome diet, and are personally cleanly, however intimate their association with the leper is.

(2) That the disease may be hereditary, but frequently skips generations, and becomes less severe as the descent becomes remote.

(3) That the presence of constitutional syphilis increases the liability to the disease.

(4) That though very intractable, it is not incurable, and that cases improve under treatment; and there are occasionally instances of spontaneous cure.

(5) That there are other diseases much more dangerous to life and health rife in these colonies, and that there is no just reason for the unreasoning dread and horror in which leprosy is held by the majority of the people.

SHORT ACCOUNT OF THE CLIMATOLOGY OF NELSON, NEW ZEALAND; AND THE DISEASES FOR WHICH IT IS MOST SUITED.

By Jas. Hudson, M.B. Lond.

The town of Nelson is situated at the head of Blind Bay, in about 41⅓ parellel of south latitude, almost exactly the same latitude as the City of Wellington, and right in the course of the westerly winds; yet, while Wellington is so windy, that it is often spoken of as the "City of Blow," Nelson is comparatively free from wind.

The reason for this is seen in the disposition of the Mountains. The main range of the Southern Alps, the backbone of the Middle Island, about eighty miles south of Nelson, splits, roughly speaking, into an eastern and western range. The former is continued through the Spencer, St. Arnaud, and Raglan Ranges, Gordon's Knot, Ben Nevis, &c., into those lower ranges which terminate about the Pelorus and Queen Charlotte Sounds. The latter (*i.e.*, western) is continued through the Brunner, Lyell and Owen Mountains, and the Mount Arthur Range, to the gradually lessening declivities, which terminate at Separation Point and the Farewell Spit. Between these ranges, lie Nelson and the shores of Blind Bay. The effect of this is, that easterly, westerly, or southerly gales are to a great extent deflected, and blown over the town, leaving the lower atmosphere comparatively still. A striking demonstration of this fact may be frequently observed on moonlight evenings, when the clouds may be seen travelling over the moon at a considerable rate, while the lower atmosphere is absolutely still. The nights of Nelson are usually still; spring is the most windy season, and winter the least so.

The most characteristic winds of Nelson are—first, the sea breeze; and second, the Waimea wind. The direction of the first is northerly, and generally accompanies fine weather. In summer, it usually commences at about 9.30 or 10 a.m., and blows strongly until sunset, reaching its maximum force at about 2 to 3 p.m. At night, and early morning, there will be a slight land breeze from a S.S.E. direction. In winter, the sea breeze is a very gentle zephyr, commencing about noon, and blowing very gently until about 4 p.m., soon after which the sun sets behind the western hills; and the consequent sudden fall of temperature, say between 4 and 6 p.m., is one of the most trying features in the Nelson climate. Invalids with delicate chests should beware of that period (4 to 6 p.m. in winter), and always arrange to be in the house. After 7 or 8 o'clock, there is much less danger of exposure, for then the atmosphere has in great part deposited its moisture, and is consequently much dryer, and less irritating to the bronchial mucous membrane.

The Waimea wind is S.W. in direction. It is a cold wind in winter, for it blows off the then snowy mountains; but a hot, dry, dusty wind in summer, for then it comes from over the parched-up hills. It usually does not commence until about 9 a.m., then blows hard all day, winter or summer, and usually dies away about sunset, though occasionally it will continue fitfully blowing all night. It is produced by a combination of the general westerly wind (all over New Zealand); and locally, by the sun heating the low lands round the shores of the bay, and so raising the atmosphere—and the colder air from the mountains rushing in to supply its place—in fact, a sort of reversed sea breeze, only it will not occur except there be a westerly wind blowing over this part of New Zealand. It is the driest wind we have, and is always indicated by the hygrometer showing a large difference between the wet and dry bulbs. To give an instance—on January 2, 1888, a Waimea wind was blowing; at 10 a.m. the dry bulb stood at 81, the wet at 62, indicating a dew point of 40·6, and a relative humidity of 23, taking 100 as saturation. That was the hottest and driest day we have had this year.

Our coldest wind, and at the same time most bracing, is the S.E., this is generally squally, and not unfrequently showery; and if ever we get snow in Nelson (which is extremely rare, only once did a few flakes fall within the last eight years), it comes with S.E. weather. S.E. winds are most prevalent in the early spring. Our rainy wind is the N.E. A typical Nelson rain comes on something like this—you may notice a bank of cloud along the northern horizon, and clouds more or less piled up over the eastern and western ranges; a damp northerly breeze begins to blow, this increases in force, at the same time getting warmer, and then down comes the rain, accompanied with much wind at first. Gradually the wind lessens, the rain comes down straight, and then, if you notice the sky beginning to get lighter over the N.W., you may pretty certainly prophesy the rain will soon cease.

Our rainfall averages from 30 to 40 inches per annum; in 1887, it was 29·04; and in 1888, up to the present time (December 11), it has amounted to 26·38 inches. Comparatively little rain falls during January, February and March, the rest is pretty equally distributed throughout the remaining nine months. North westerly winds are damp and warm, they often blow with great violence and cause high tides; they pile up a tremendous quantity of mist on the south back hills, and give the appearance of a heavy downpour, but we never get more than a shower with N.W. weather. After a short time the wind usually changes to S.W., and all the mist on the hills rapidly disappears.

Statistics of Observations extending from October 1885 to November 1888.

Month.	Average temp. for month at 10 a.m.	Highest for month at 10 a.m.	Lowest for month at 10 a.m.	Relative Humidity.	Driest Day.	Dampest Day.	Rain-fall.	Number of Days on which Rain fell.	Number of Days of continuous, or nearly continuous, Sunshine.	Average Minimum.	Lowest Minimum.
October 1885	57	72 (31st)	45 (4th)	..	..	..	3·00	7	21	..	..
November ,,	63·3	71 (1st)	56 (18th)	..	..	..	2·18	7	21	..	..
December ,,	69	75 (22nd and 31st)	60 (8th)	..	..	..	1·36	8	23	..	..
January 1886	71·2	77 (19th)	61 (29th)	..	..	..	2·73	5	19	..	..
February ,,	70·8	74 (7th and 18th)	64 (9th)	..	..	..	2·98	7	17	..	..
March ,,	..	..	..	..	..	..	3·00	12	..	..	..
April ,,	..	..	..	..	..	..	2·77	8	..	..	..
September ,,	54	62 (19th and 20th)	47 (15th)	..	..	..	5·88	11	16	..	..
October ,,	57·3	65 (21st)	49 (6th)	..	..	..	5·64	13	15	..	..
November ,,	62·7	70 (24th)	57 (1st and 9th)	..	..	..	2·25	9	15	..	..
December ,,	68·2	74 (9th and 30th)	61 (12th and 15th)	..	..	..	0·82	3	23	..	..
January 1877	76·2	80 (17th, 18th, 26th, and 27th)	71 (1st) *	..	..	..	0·14	2	25	..	..
February ,,	70·8	74 (7th and 18th)	64 (9th)	..	..	..	2·05	6	18	..	..
March ,,	66·6	73 (1st)	58 (26th, 28th, and 30th)	..	..	..	0·70	8	19	..	..
April ,,	61·4	69 (5th)	48 (28th)	..	..	..	2·16	8	18	..	..
May ,,	51·3	64 (11th)	39 (27th and 29th)	..	..	..	2·25	12	13	..	..
June ,,	49·5	60 (22nd)	37 (30th)	..	..	..	2·17	9	10	..	..
July ,,	45·3	56 (7th)	38 (2nd and 3rd)	..	..	..	2·98	11	15	..	..
August ,,	45·4	54 (21st and 22nd)	41 (11th)	..	..	..	1·94	5	22	..	..
September ,,	53·1	60 (27th and 28th)	48 (11th)	70	50 (14th)	93 (11th)	4·92	18	11	..	..
October ,,	57·5	65·5 (31st)	42 (2nd)	64	45 (16th)	91 (20th)	3·37	9	18	..	..
November ,,	63	70 (4th)	57 (15th)	64	47 (20th)	86 (7th)	4·65	14	16	..	..
December ,,	68·7	76·5 (20th)	51·5 (4th)	63	43 (27th)	93 (4th)	1·71	10	15	..	..
January 1888	69·5	81 (2nd)	61 (9th)	60	24 (2nd)	73 (22nd)	1·77	5	20	..	..
February ,,	66	75 (6th)	56 (20th)	64	39 (7th)	89 (15th)	0·79	3	23	..	..
March ,,	62	71 (1st and 4th)	49 (28th)	75	47 (21st)	95 (9th)	4·00	10	17	..	..
April ,,	57·7	62 (17th)	48·5 (27th)	74	51 (5th)	94 (13th)	1·78	6	16	..	..
May ,,	53·3	63 (12th and 13th)	43 (30th)	80	63 (11th)	94 (10th)	1·99	9	14	..	..
June ,,	47	56 (5th)	37 (8th)	86	62 (9th)	100 (4th)	2·26	9	15	..	..
July ,,	45·1	52·5 (27th)	41 (5th, 8th, 13th, 14th and 20th)	82	62 (30th)	94 (11th)	3·60	12	17	..	..
August ,,	51·5	59 (7th)	46 (1st and 24th)	81	62 (26th)	97 (18th)	3·46	16	9	40·6	30 (28th)
September ,,	54	62 (27th)	48 (13th and 14th)	73	51 (21st)	94 (25th)	1·23	7	18	39·7	31 (13th)
October ,,	59·4	65 (13th and 20th)	52 (21st)	71	50 (1st)	94 (19th)	3·22	14	18	41	33 (30th)
[illegible]	[illegible]	[illegible]	53 (23rd)	75	55 (24th)	97 (14th)	1·98	11	13	38·5	30 (23rd)

The chief characteristics of the Nelson climate are:—

(1) Stillness of atmosphere.

(2) Dryness of atmosphere.

(3) Equality of temperature throughout the year.

(4) Large proportion of bright sunshine.

The first point I have already touched upon.

The second is strikingly shown by the almost entire absence of fogs at the sea level, and for almost 500 feet above it. During the eight and a half years I have been resident in Nelson, there has only been one foggy day (of course I mean white mist, not yellow London fog); this occurred in July 1885, and cleared up towards evening. I think this is the more remarkable, as in certain interior districts of Australia, which are at the same time much hotter and drier than Nelson, are subject to fogs, at any rate, in the winter months. For instance, I happened to be staying at Goulburn, N.S.W., for a few days in July 1886, and although it was fine weather, the fog was very dense until about 10 or 11 a.m. This is a most important factor in the suitability of Nelson for consumptives. Of course I am speaking of the lower strata of atmosphere; mist on the hills is of almost daily occurrence. The average relative humidity of Nelson is about 70, taking 100 as saturation; and as might be expected, the summer months, January and February, are the driest; and the winter months, June and July, the dampest.

Third—Equality of temperature throughout the year.—This is a striking feature in the Nelson climate. The average day temperature, taken at 10 a.m., varies from about 45° in July to a little over 70° in January. I have taken the temperature carefully for the last three years (at 10 a.m.), and the highest of which I have any record is 81° on January 2, 1888, and the lowest is 37°, in June. These are day temperatures. On winter nights, the thermometer will sometimes fall to 25°, when fully exposed on the grass; and even in summer the nights are always cool. The temperature usually rises slightly after 10 a.m., but not much, for the sea breeze usually sets in about that time, and the warmer the day the harder it blows, and so keeps the temperature from rising much. My thermometer is placed under a verandah, facing the south, and I have never known it reach 90° at any time. The summer minimums range from 40° to 55°.

Fourth—Amount of sunshine.—Bishop Selwyn, long ago, drew attention to the sunny skies of Blind Bay; and, although very many parts of Australia and Africa can show a larger record in this respect, still, taking into consideration that Nelson is excellently supplied with water for all household purposes, and that there is plenty of rainfall for agriculture, it is perfectly wonderful the amount of sunshine we get. I find, from my observations, that out of thirty-two months, containing in the aggregate 973 days, there were 550 days of continuous, or nearly continuous (*i.e.*, days on which the total obscuration did not amount to an hour), sunshine. During the same period there were 283 days (*i.e.*, 24-hour periods) on which rain fell. These must not be considered rainy days, as in many instances the rain fell in the night, and even if it only fell for ten minutes, it would be recorded in my observations as rain having fallen on that day. The nights in Nelson are never very

hot; no matter how oppressive the day may have been, the nights and early mornings are always cool, and feel like a pick-me-up.

We now come to the consideration, most interesting to our profession, of the diseases this climate is suited for. Foremost in the list stands consumption. My eight and a half years' experience enables me to speak very confidently on that point; and I can assert without any fear of contradiction, that almost every case of consumption, contracted in a cold damp climate like England, will be considerably benefited, and life much prolonged, by a residence in Nelson. This has been observed time upon time, and I will now give a few details of individuals known to me personally :—

J. G., a young man, came from England two years ago, with considerable disease in both apices, pyrexia, quick small pulse, &c. He rapidly improved in every way, and now rides and walks just like any other man, attends meetings at night and in all weathers. I have not examined him lately, but see him constantly about the town.

W. S., a medical man, came from home with phthisis considerably advanced. He was able to follow a large general practice for over ten years, including plenty of night work. During this time the disease never advanced, and he became quite stout; but unfortunately, while in his usual health, he was seized with an attack of hæmoptysis, due to the old disease, and he expired within a fortnight.

W. B. G. contracted apical pneumonia in India, in the early part of 1880. This was followed by phthisis, for which he went to England, and spent the winter of 1880-1 at Davos Platz, where he derived very much benefit, so much so that he ventured back to India; but finding that he rapidly relapsed, he returned to England, and came out to Australia about October 1881. He now lived for some months on a sheep station in the interior of N.S.W., but finding the heat too great for him, he came to New Zealand in the early part of 1882, and lived for some months at Tauranga, in the Bay of Plenty. Not feeling satisfied with his progress, he removed to Nelson in August 1882, where he remained under my care for three years. During this time he was a valetudinarian, but kept tolerable health; however, he was not satisfied with remaining about the same, he wished to get well, and remembering how very much benefit he derived from residence at Davos Platz, he decided to try the mountain climate of Colorado. There, however, he was very unfortunate; he broke his arm, he had an attack of hæmoptysis (this latter symptom he never suffered from in Nelson), and about a twelvemonth ago, I heard of his death at Colorado Springs.

W. T. showed symptoms of incipient phthisis about twenty-five years ago; since his arrival here he has married, brought up a family, and lives just like any other man.

Of course we get cases of consumption develop here in people born in the district, and occasionally in those who have come out from Great Britain, free from the disease; for these, of course, continued residence in the climate is useless, and I always recommend such cases to either try the dry interior of Australia or South Africa, and better still, the mountain climate of Colorado.

Cases of chronic bronchitis, contracted in Great Britain or any similar climate, derive great benefit in Nelson. We have here, among us now, an elderly F.R.C.S., who four or five years ago was brought

very low indeed with this malady, combined with a weak heart. He was ordered to Nelson, and since his arrival here has enjoyed uninterrupted fair health; attends evening meetings, &c., and goes about just as any other individual.

Asthma is such an erratic disease, that it is impossible to say whether it will be benefited or not by a residence in Nelson.

The Nelson climate also appears to be suitable for people more or less broken in health by residence in the tropics. We have now, and always have had, several old Indians living amongst us; one I can think of now, who has been a victim to gout and rheumatism for several years, finds this climate suit him better than any he has tried yet.

The weak point in Nelson, as in so many colonial towns, is its drainage; this is gradually improving year by year, but is far from perfect at present—not that the town presents any insuperable difficulties in the way of drainage, and we have enough available water to flush a sewer ten feet in diameter, continuously all the year round—but the sewers have been constructed by different men, having different ideas, and none of whom have been qualified to write C.E. after their name. To this flaw, in an otherwise almost perfect climate, may be attributed the fact, that we are more subject to epidemics than we ought to be. The principal ones that have occurred since I arrived in May 1880, have been:—An epidemic of pneumonia, in September and October 1880; of measles, in 1882; whooping cough, in 1882; dysentery, in 1885; influenza, in the spring of 1887; and diphtheria, in the winter of 1888. With regard to this last, the majority of the cases were traceable to direct contagion. Occasional cases of typhoid fever occur, but I think, rather less frequently than I observed when practising in a rural district of Norfolk, England. Our comparative freedom from typhoid fever I attribute to our excellent water supply, of which every Nelsonian is justly proud. The water supplied is perfectly pure, and practically unlimited. Our food supply is, in common with the rest of New Zealand, good, varied, and abundant.

THE COLONIES AS A HEALTH RESORT FOR CONSUMPTIVES.

By J. Carnegie MacMullen, L.R.C.S.I., &c.

Late Honorary Surgeon, Auckland Hospital, New Zealand.

The subject of consumptives travelling to, and sojourning in, these colonies, is of such great importance, that I wish to make some remarks upon it, from the time such sufferers leave Great Britain, until they recover, return, or die.

In the first place, it would appear that medical men in the old country, having exhausted the usual remedies, advised change of air, regulated diet, &c., and finding no improvement in their patients, at last come to the stereotyped "sea voyage," with or without residence in the colonies "somewhere." They do not, as a rule, seem to have any special knowledge as to the suitability or otherwise of any

particular locality; and so little do they seem to know of the colonies generally, that a patient is frequently told to go to Australia or New Zealand, no advice being given as to what part of either will be likely to suit him. He may be roasted in Queensland, or frozen in Tasmania; be exposed to the intense cold and inclemency of Southland, or enervated by the moist warmth of the north of New Zealand. He is not told to go inland, or to the sea; to remain in a town, or seek the country. If he can only be got away, he may crane over an office desk, idle about town, going to hot theatres and crowded balls; or, if he be fortunate enough to receive competent advice, he can live a wholesome life in a suitable place, provided he can afford to do so, in which case, if his lungs are not seriously damaged, he has a good chance of getting well.

With regard to the sea voyage, if a patient has advanced phthisis, I do not think he should be sent upon a long sea voyage with a view of re-establishing his health, for the vast majority of cases show that death is the usual result; and I would here quote a few passages from the valuable work by Dr. Wm. S. Wilson, of Sandown, Isle of Wight, on "The Ocean as a Health Resort" (J. and A. Churchill, 1881). He says, at page 14:—"Consumption is the illness of all others for which it is now customary to prescribe a sea voyage, although it is only comparatively of late years that this has been the case. There can be no doubt that, in the first stages of consumption, a judiciously selected sea voyage is often of incalculable value—*the one great point is to take the disease sufficiently early*, if possible when the first threatenings only have manifested themselves. Every physician is familiar with cases where, while the patient is still young and the constitution otherwise sound, symptoms arise which, though they might be regarded as trivial by the patient himself, will be at once recognised by the medical man as of grave import, especially if there should be any family predisposition to lung disease. These are, in fact, the premonitory symptoms of what may prove serious pulmonary mischief. It is in just such cases as these that a sea voyage acts most beneficially. It will often eradicate the tendency to consumption, and establish the constitution for life. Even in those cases where the first stage of the disease is more fully established, a few months at sea will frequently arrest the mischief, and sometimes effect a permanent cure. It is when the disease has passed into its later stages, that the advisability of sending a consumptive patient to sea becomes more doubtful. Even then great benefit will sometimes be obtained; but the question whether the possible good which *may* result, will weigh against the certain loss of home comforts, and the many inconveniences of ship life, is one that can only be decided by the physician in attendance on the case."

Even for those slightly affected, it is not good to travel in a noisy ship, for it is anything but beneficial for a consumptive person to make one of three or four in a small ill-ventilated cabin, putting aside the danger, which is far more than a mere possibility, of his imparting the disease to one or more of his companions, especially should any predisposition exist amongst them.

A sailing ship, or auxiliary screw steamer, should be chosen, large and well provisioned, having plenty of accommodation, good ventilation, and properly warmed in cold weather. There should be on board a

large airy and well-appointed hospital ward, to which patients suffering severely from any form of disease might be removed, both for their own sakes, and for the comfort and well-being of their fellow passengers. (Valuable information on the subject of ventilating ships' cabins, &c., is given at page 330 of Dr. Wilson's book.)

On arriving at any port in the colonies, if intending to remain for any length of time, the patient should consult a physician (say the Health Officer of the port, who should make it his duty to be well informed as to the various localities and climates likely to suit his case) as to where and how he should live; and should he have arrived at any unsuitable place, be advised to seek some other more likely to benefit him. If the circumstances of a patient make it necessary for him to engage, on arrival, in office-work, or other unsuitable employment in a large town—placing himself more or less under similar conditions to those he has just left—I do not think he can improve, and would have been better advised to remain where he was.

As to the main question of the colonies as a health resort for consumptives, I do not wish to extol one place as being better than another, although certain parts are, no doubt, to be avoided. There are parts of each of the colonies which are eminently suited for those suffering from pulmonary disease, but they must live in those places under certain healthful conditions conducive to recovery. They should live in a comfortable house, well ventilated, warm in winter, and cool as possible in summer. Their food should at all times be varied, and of the best quality. There should be ample supplies of fresh milk, butter, eggs, and vegetables. The question of stimulants should be decided in each case by the medical attendant, both as to kind and quantity allowed. Smoking should be limited, and clothing carefully selected to suit the climate. The patient should live in the open air as much as possible, but never over-fatigue himself. Riding, driving, shooting, fishing, and any other healthful occupation or amusement, will greatly benefit him; but excesses of any kind must carefully be avoided. Under such circumstances, I feel confident that many would recover who otherwise would go from bad to worse; but the difficulty lies in placing such conditions within reach of those requiring them. Many are fortunate in having friends on home stations and farms, where all the necessaries I have mentioned can be had. But there are so many who must work to live, that the question is rendered very difficult of solution, and it is mainly with the object of raising discussion on this point that I have brought the subject forward, and in order that, if possible, the question should be represented in such a light, that more care and discrimination may be exercised in the selection of patients sent to Australia and New Zealand for their health, thus also avoiding discredit being thrown upon our colonies as a health resort.

We frequently see patients far advanced in phthisis, who have been sent from home by their doctors, having been told that there was a good chance of recovery. Such a case came into my hands quite recently. A gentleman from Glasgow arrived by sailing ship at Auckland; he had been sent away without friend or servant to accompany him, and assured that he had a good chance. He was one of three in a cabin, and the ship was ill-provisioned. On arrival, he was in a dying state, though not much worse than that in which he

started. I managed to keep him alive for a few weeks, and then sent him back, hoping he would see his wife and children again before he died. Anyone could have seen that when he left home, his case must have been a hopeless one, and yet he was sent away without a friend to cheer, or servant to help him, in a comfortless ship, to spend the last few weeks of his life in misery, a stranger in a strange land, and to die without the sympathy and kindly offices of his family, none of whom he was likely to see again.

Cases of this kind are of such frequent occurrence, that I think it our duty to lift our voices in strong protest against the practice of medical men at home sending such cases away at all, and to beg of them to use all care in considering the circumstances, both physical and financial, of any patients they may advise to seek for health in the colonies.

With regard to the difficulties to be met here in giving patients the best chance of recovery, I would suggest the possibility of selecting suitable localities for health establishments, and there having large farms with cottage dwellings, where patients would live as in their own homes—two or three friends in one house, a family in another, &c., &c. Servants could be procured as required through reliable agents. A manager would supervise the working of the farm, and the general well-being of those living on it. Horses and vehicles could be kept for hire, and fruit, &c., grown on the farm, could be purchased by the patients. Sheep, cattle, pigs, poultry, &c., could all be raised on the farm.

In conclusion, I would again refer to the great danger to healthy persons from sleeping in small apartments, and for lengthened periods, with those who are suffering from advanced phthisis. Recent scientific research has shown conclusively that, under such circumstances, phthisis is undoubtedly communicable. It is therefore our duty to warn the public who are unaware of the fact, which I do not think is sufficiently recognised even by the profession. My hope is that discussion on this subject will lead to some practical steps being taken for the benefit of the healthy public, for consumptive travellers, and the phthisical portion of our population, which is not by any means inconsiderable.

SOME OBSERVATIONS ON THE WESTERLY WINDS OF WINTER IN THEIR INFLUENCE ON DISEASE.

By F. Milford, Sydney, N.S.W.

In the winter of the year 1851, when a student at the Sydney Infirmary, now the Sydney Hospital, the late Dr. Douglass, one of the honorary physicians, drew the attention of the other pupils and myself to the important fact that, "during the prevalence of the present strong westerly winds, the tongues of patients suffering from inflammatory disease have been dark-coloured and dry." Since that period, when I have had an opportunity of observing, and during the last thirty years that I have been in practice in Sydney, I have found the epidemic constitution of the year influenced considerably by the presence or

absence of these strong winds. As a rule, these produce a depressing influence on the nervous system of persons suffering from disease, and robust healthy persons are more subject to assume zymotic disease at these times than at others. Inflammatory attacks of a sthenic character, during the prevalence of these winds, in some cases rapidly become asthenic, typhoid symptoms supervene, the tongue becomes dry, hard and brown, the temperature elevated, the pulse rapid and small, and the patient delirious. So much has my practice been influenced by the presence of these winds, that I have been in the habit of postponing any surgical procedure, not absolutely necessary, until such period as the westerly has blown itself out—perhaps two or three days, or even more.

As a rule, westerly weather prevails during the winter months, but occasionally a whole winter may pass without strong gales from this quarter. The westerly wind is more prevalent during April, May, June and July, than other winter months. It may blow directly from the westward, or southward, or northward, varying sometimes three or four points during the day.

Mr. Thorpe, of Brisbane, in the year 1880, read a paper before the Queensland Philosophical Society on these westerly gales, which was afterwards printed in pamphlet form. Through the courtesy of Mr. Lenehan, Assistant Astronomer at the Sydney Observatory, I have recently had the opportunity of perusing it. He ascribes the origin of most of the westerly gales of our winter months to an inrush of cold air from the Southern Pole, which at first blows directly from the south, and gradually curves round so as to blow from the west. After arriving at between 35° and 25°, the gale alters its direction to the westward, or a few points to northward or southward of it. Shortly before the westerly commences, the barometer falls considerably; is seen to be often as low as 29° 50′, and I have seen it as low as 29°. The gale during the first twelve or twenty-four hours frequently blows at a velocity of from fifteen to twenty miles an hour, and sometimes assumes a rapidity of from forty to fifty miles. This wind is usually very dry; caused, according to Mr. Thorpe, by the deposition of the moisture originally contained in its atmosphere during its passage along the southern coast of South Australia and Victoria, and the inland districts to the southward and westward of Sydney and Brisbane. During the prevalence of the wind, the barometer gradually rises, the sky is perfectly cloudless, the temperature in Sydney varying from 48° to 62°. We learn also from the Government Astronomer's report (Mr. H. C. Russell), that the amount of ozone in the atmosphere is less than during the prevalence of easterly, north-easterly, and south-easterly weather.

From tables most kindly furnished me by the Government Astronomer, I have been able to draw up a *resumé* of the various prevailing weather which has occurred in Sydney during the first eight months of 1888:—

During January, the most prevalent direction of the wind was easterly during thirty days. The greatest velocity was from north-east or south-east. On thirteen days out of the month, there were some periods during which westerly airs prevailed, but there was only one day in the month when its greatest velocity was from a westerly

quarter; this was the 15th, and the wind was S.S.W. The mean temperature of the month was 70° 8′ Fah.

In February, twenty-two days partook of westerly weather, although in two days only was it the prevailing wind, *i.e.*, on the 10th and 24th. Mean temperature was 64° 9′ Fah.

In March, there were no less than twenty-seven days which partook more or less of westerly weather, and in thirteen it was the prevailing wind. Mean temperature 67° 7′ Fah.

In April, twenty-seven days partook of westerly weather, but only eight in which it was the prevailing wind. Mean temperature 64° 9′ Fah.

In May, the wind blew every day from the westward more or less, and there were thirteen days in which it was the prevailing wind. Mean temperature 56° 7′ Fah.

In June, the wind was more or less westerly during the whole of the thirty days, and during twenty-three days was the prevailing wind. Mean temperature, 55° 7′ Fah.

In July, the whole thirty-one days showed westerly weather prevalent, with the exception of a few hours during nine days and two days (the 7th and the 11th), when it blew strongly from S.S.E. and S.E. respectively. Temperature, 53° 5′ Fah.

In August, there was more or less westerly weather during the thirty-one days, and sixteen days out of the thirty-one days it was the prevailing wind. The mean temperature at Sydney was 54° 5′ Fah. With the exception of the direction of the winds, their force, the barometric pressure, and the temperature, the hygienic conditions of Sydney did not alter, although we find from the Registrar-General's returns that deaths from diphtheria increased from March to July. The deaths recorded from this cause in Sydney and suburbs during the first months of the present year are as under:—

DEATHS IN SYDNEY AND SUBURBS.

January	5	May	15
February	7	June	12
March	6	July	17
April	11	August	10

It will thus be seen, that the deaths from diphtheria increased and decreased in the same ratio with the duration and strength of the westerly winds.

As a rule, catarrh and influenza are more or less epidemic during the prevalence of these westerly winds. These are caused, not only by the retardation of the circulation, occasioned by abstraction of heat from the cuticular surface of the body, contraction of the capillaries, and congestion of the vessels in the internal organs, but also by the irritating nature of the cold dry air itself, brought into contact with the mucous membranes of the nose, mouth and throat, as well as the lining membranes of the larynx, trachea, and bronchi. This is, in my opinion, one of the most predisposing causes of diphtheria.

I have known at least three rapid deaths result from exposure to westerly winds during the months of May and June in the tram carriages, the persons thus dying being, in two cases, healthy nursing mothers; and in the third, a healthy old man of eighty. The cause of death in these cases was congestion of the internal organs, especially

the lungs and kidneys. The persons most likely to suffer are those who have a tendency to chronic bronchitis, or are affected with incipient or miliary tuberculosis of the lungs. Persons who meet with severe accidents, or undergo capital operations, do not rally from the shock during strong westerly weather, as well as they would during the presence of calms or light breezes.

In selecting a site for a hospital or asylum for the abode of old or sickly persons, I think it is important that it should be protected as much as possible, by being placed under the lee of some projection, which might ward off from it the full force of the westerly gales. Those suffering from illness during the winter in their own dwelling, should occupy a room with an easterly aspect.

I am afraid I have encroached considerably on the time and patience of the Members of the Section, in offering these observations for their consideration, but my excuse must be that, although I advance nothing new to the seniors, yet junior English and Foreign practitioners may gain some hints which may be of advantage in their practice, both to their patients and themselves.

SHOULD THE MEDICAL PRACTITIONER BE AN OFFICER OF THE STATE?

By James T. Mitchell, M.D.

In introducing this question to the Section of State Medicine of the Intercolonial Medical Congress, I do so with the object of initiating a discussion upon the relation of medical practice to the great masses of the people, who form the bulk of the community. It is not claimed that the scheme here sketched out is the best that could be devised, or that it is perfect in its details; but this is an endeavour to meet a felt want, and one that will press itself more and more upon the attention of the community. Within the limits of this paper, I cannot hope to give an exhaustive analysis of the question, but I shall attempt, as briefly and clearly as possible, to show the need of some improvement upon existing arrangements, and to suggest some alterations that appear to me to point towards a solution of the difficulty.

It can scarcely be gainsaid, that the relation of the medical profession to the public is not at present all that can be desired. The constant introduction of medical bills into our Colonial Parliaments, evidences the dissatisfaction of the profession on the one hand, and of the public upon the other. This age is essentially one of government by the people. We socialise our education, our railways, waterworks, postal and telegraph systems, &c., and we shall no doubt live to see a great many other things put upon the same basis. Whether or not it would be to the advantage of the public, or of the medical profession, or both, that we as a profession should be part of a State institution, is a question well worthy of consideration from both points of view.

The system here advocated is already admitted in these colonies in some most important branches of our work. Public health or preventive medicine is recognised as being an aspect of the question that very largely concerns the public safety. Hence our costly quarantine stations, examination of over-sea vessels, the Destitute Medical Relief Department, and Boards of Health, both Central and Local, scattered over the colonies, each having competent officers and advisers from among the medical profession, paid for out of the public purse—either the general revenue, or local rates. No one doubts the necessity of these arrangements, or of the still more costly vaccination departments; and the intelligent public would view with alarm any movement which would lessen the efficiency of either the Public Health or the Vaccination Departments, as endangering the safety of the inhabitants.

What we are here considering is, the question of the advisability of extending these departments, to include public health in its widest signification. The public being made up of individuals, the health of these individuals is the public health; and what affects the units, affects also the mass to a corresponding degree. Granted that the destitute poor are fairly well provided for under present arrangements; still, outside these is the great mass of the people, far and away outnumbering the few who are so favourably circumstanced as to be easily able to afford medical attendance without stint. Granted also, that the existence of Friendly Societies covers a portion of the ground indicated; this latter, however, is perhaps the least necessitous portion. Able-bodied men in good health only are admitted to these societies. The weakly, and women struggling single-handed to bring up their families, are inadmissible: and these are really the needy ones. Here, then, is the failure of existing arrangements. For the most part, those best able to afford medical attendance in sickness are those for whom it is easily provided; while those least able to afford it are scarcely, if at all provided for, except at the expense of generous and philanthropic individuals, who are already taxed equally with the rest of the community.

It is to the advantage of the State that all its units be as healthy and as strong as possible, so that they may have the greatest possible working efficiency. The honest poor try their utmost to avoid a doctor's bill, and do not send for a doctor until they are absolutely obliged to do so. In very many cases, they do not send until the case has assumed such an aspect that it is beyond treatment, and their lives are thus thrown away, when but a very little medical skill would have saved them. The dishonest are not so chary of claiming attendance, and the unwary doctor is victimised. When sickness occurs, there are so many expenses, and probably at the same time, diminution or cessation of income, that a man is least able to pay for attendance. It is nothing at all unusual for the man to get so far behindhand during a tedious illness, that he can never hope to overtake it again. Whatever ready money he could obtain, has gone to the tradespeople, for the doctor would be scouted if he applied for money under the circumstances. When the man attempts to resume work, weakened by his illness, he is often in utter despair about the debts, and goes through the Insolvency Court, or otherwise gives it up. Public sentiment is

very exacting with regard to the Medical Profession. No doubt, we have to some extent induced this feeling, and very properly so too in some cases, by ready and willing attendance, where there is not the least prospect of payment. We hold ourselves up as a humane profession, and humanity is not slow to push its claims upon us.

Look, for instance, at street, railway, and river accidents. Public sentiment demands that the doctor shall attend these promptly, no matter at what inconvenience, and is highly incensed if there be any apparent neglect. These cases require a considerable amount of time, ready wit, and quick and skilful treatment, and yet it is notorious, that they are seldom paid for. The victims either disappear, or disclaim liability, and the company or other person or persons causing the accident also disclaim, while the doctor must either go without his fees or recover them by law. Very frequently also, to these accidents half-a-dozen doctors are fetched by the bystanders, and it is impossible to demand fees for all. I venture to assert, that on no other profession are such heavy demands made for gratuitous services, and perhaps so little appreciated. Indeed, very much of the gratuitous service seems to be estimated at cost price, judging by the way it is often received, and grumbled at.

Position of State Doctors.

Under a system of State medical practice, every doctor should be at liberty to locate himself in any place he might choose, as he does now. The demand must regulate the supply, and he would naturally go where he could make the best living. Everyone would still be independent of every other one, unless he choose to enter into partnership, and he would be answerable only to the State and to public opinion. No one would be over-worked any more than now. When he had done as much as he could, or as he cared to do, he would refuse further calls. The more work he did, of course the more pay. There would, therefore, be the same incentive to the exercise of the best possible talent, attention and skill, as now. Popular and successful practitioners would be always busy, while the weaker men would be less sought after, as now.

But the public, relying on State medical attendance, might, and probably would, demand to be looked after at any hour of the day or night, upon showing reasonable cause. Nowadays, when a doctor is thoroughly tired, he declines to go out till rested; but it would, no doubt, be necessary for doctors in any district to take turn and turn about with urgent work, each man being on special emergency (night) duty for a week at a time. In these days of telephones, such arrangement could be most easily worked.

Therefore, the difference to the doctors themselves would be very slight, except in the matter of certainty of payment, while the difference to the public would be very great indeed, ensuring best attendance to those most requiring it in the early stages of disease.

If it were thought necessary or advisable for the State to supply medicines, surgical appliances, &c., also free of charge, that would be done upon the prescription of the State Medical Officer; but the arrangements for carrying this out would come rather into the province of the druggist than into ours, and therefore I need not further consider it.

Vaccination and Public Health appointments could be included in their duties at their option, and the appointments being made by a central authority, there would be no chance of local jealousy or favouritism electing an unsuitable candidate, the best man always being selected.

There should be nothing in this scheme to prevent any doctor from practising in a wholly private capacity, should he prefer so to do, rather than be a State officer. Operating and consulting surgeons, consulting physicians, and specialists, might desire to be independent in their practice, and they should have this liberty. They would then have to collect their own fees, and would probably be as well supported, in comparison, as our private colleges and schools are, in spite of the great public schools available, either free or at a nominal charge.

English and German Laws.

Foremost among the successful legislative experiments of modern times is the English Poor Law, which, with little substantial alteration of principle, has stood the test of fifty years' experience. It is too well known to the Members of this Congress to require elaborate notice here. I would remind you that, upon proof of a man being unable to procure medical attendance, through being out of work, the Poor Law Surgeon attends, provides medicine and surgical appliances, and, if needful, orders medical comforts at the expense of the Union, with power, in some cases, to send the patient into the Union Infirmary. The surgeon is paid a fixed annual salary, irrespective of the amount of work he may do in any one year, and is also given extra fees for operations, accouchements, and the reduction of dislocations and fractures. The appointment of the surgeon is by the Board of Guardians of the district, a local body liable to caprice, and his tenure is not the most secure. Only the very poor are hereby provided with attendance; and a man in employment, with small wages and with a large family, must employ a surgeon at his own expense, although practically unable to pay the doctor anything for his services.

The German Laws, being very much more modern, may not be quite so well understood, and I therefore venture to draw your attention to an article in the *Contemporary Review*, August 1888, dealing with them in a very able manner. It says:—"The Emperor William's message to his Parliament of 1881 admitted most completely the right to public assistance; it recognised that the modern State is bound to take positive steps to secure the life of the great mass of the people against the vicissitudes to which it is subject; and it initiated a series of legislative experiments of great boldness and magnitude, which are well worthy of the observation and study of other nations."

In 1883, the Act for Compulsory Sick Insurance was passed by the German Parliament. In 1884, the Act for Compulsory Accident Insurance passed; while that for Insurance for Old Age and Invalid Pensions was only introduced into the Reichstag during the current year 1888.

Under the Sick Insurance Law, only those who are in regular employment for wages are subject to this compulsion, but others who follow industrial employment have the right of insurance by voluntary entrance. The assistance is not worked directly from a State depart-

ment, but by local clubs or unions amongst the various trades. Nothing has to be done by the workman himself; the mere act of getting employment insures him, as the onus is thrown upon the employer, who must give his name to the club, and forward the money regularly deducted from the man's wages.

Some objections to the German scheme are these :—The multitude of small unions must of necessity be more expensive in management than one central department, and the small funds could not be laid out to the greatest possible advantage. And again, a more forcible objection is, that a man in work is better able to pay his doctor's bill than a man out of employment, while this latter is unprovided for under the German law, unless he be a pauper.

The advantages offered by the Sick Insurance Law are :—

(1) Free medical advice and treatment, including dentistry, free medicine, and minor surgical appliances such as spectacles, trusses, &c.

(2) From the third day after the notification of the illness, a money allowance amounting to fifty per cent. of the average wages upon which the insured person's subscription is assessed.

(3) In case of death, an amount equal to twenty times the local daily wages of an ordinary day labourer payable to the survivors.

Method of Paying the Doctor and of Raising Funds for It.

No suggestion of a scheme such as the one under discussion should be entertained, unless the practical point of finances were also included in the suggestion.

It will be asked, How is the doctor to be paid, and how is the money to be raised to pay him? To answer these questions exhaustively would be very wearisome, but a few points may be briefly indicated :—

(1) The doctor should keep his own accounts of visits, consultations, accouchements, operations, &c., and charge them in his schedules according to a scale of fees fixed by the central authority; the country mileage being also determined by the same authority. At certain intervals—weekly, monthly, or quarterly—he should send them in to the head of his department, precisely as he does his vaccination schedules (South Australia), declaring that it is a just, correct, and faithful account of his work, and that no private charges have been made for any of the cases. These schedules might be audited and checked in a variety of ways, and might be subject to revision as to charges. When allowed as correct, cheques could be at once forwarded to the doctor. In anything human there is liability to fraud, but there would be no more liability in this than in countless other schedules sent in by Government officers; and, considering that we are dealing with an honourable profession, such liability would be small, for any wilful mis-statement could be summarily met by removing the practitioner's name from the State Roll, and thus depriving him of his means of livelihood; or, still more summarily, by taking the case into the criminal courts, to be treated like any other felony.

(2) How is the money to be raised? The answer should be given by a politician, rather than by a doctor. It certainly should come from a central, rather than from a local source; and for this reason, that the expense of regulating and working the system from one centre

would be very much less than if several smaller centres worked independently of one another. And also, if local arrangements were made, there would be glaring anomalies between the working of different local centres, and also in different epochs of the same centres.

Two courses are open by which to raise the money :—

(*a*) A special tax. This might, and probably would, become obnoxious, and it would be liable to interference and to constant modification.

(*b*) From the general revenue. This scheme of medical aid would be for the general advantage and of universal application, and therefore the cost should naturally be derived from the general revenue.

If this revenue be collected by "customs" or "excise," then large families pay more than small ones, and probably they are the ones needing the most attendance. If the revenue be collected by property, income, or land taxes, then those better able to afford pay more than those less able, and the strong help the weak. So, in either case, the incidence would be fair enough for all practical purposes.

An objection to this might be that we are heavily enough taxed already, and it would only be burdensome to increase taxation. But that is a fallacious manner of putting it. The cost to the community would be no greater than it is now; only the incidence would be different, and a small regular payment would have to be made always, whether in sickness or in health, instead of the present heavy burden in sickness.

Advantages of State Practice of Medicine.

This scheme would in reality be a great extension of the existing club practice, and would do away with the same by being upon a more satisfactory and permanent basis. In no way would it interfere with the functions of Friendly Societies. Then, as now, these could, by banding men together, make provision to supply a limited wage-money when the man was incapacitated from work, and a funeral donation when he died. But they would not be required to provide medical attendance, as the doctors would be as free to them as to any others of the public; and hence, their weekly contributions could be considerably reduced. Also, the constant friction between the lodge members and surgeon would be done away with, as would also the evils attendant upon tendering for vacant positions, lodge elections, &c. Undoubtedly, in order to obtain positions in these Friendly Societies, fees are at times cut down below a remunerative price, and as a natural consequence, the attendance must be less efficient than it would otherwise be.

This last view of the case is by no means confined to Friendly Societies. Whenever there is any overcrowding of practitioners, there is a tendency to reduce fees in useless competition. Although we claim that our profession is perhaps more free than any other from slovenly work, one cannot but feel that such competition will not tend to raise the standard of the work done, especially by the less able men. The competition here referred to is distinctly that resulting from overcrowding, and is not to be confounded with healthy rivalry, which tends to raise, and not to lower, the standard of work.

The standard of fees could be lowered to some extent, were this thought to be necessary. In South Australia they are possibly at the minimum, and could not be further reduced; but, in the other colonies, they range distinctly above the South Australian limit. When all work was paid for, and there were no bad debts, this could be accomplished. For, not only would the fees be certain, but the trouble and expense of complicated book-keeping would be saved, and money promptly paid is worth more than if it had been long delayed, and grudgingly paid by instalments.

All pauperism in medical relief would be done away with. The degradation that many of the honest poor feel in receiving Government attendance would be a thing of the past, as would also be the embarrassment of those in poor circumstances who are compelled to seek out a generous doctor and, from time to time, make claims upon his generosity. The poor man should be exactly as eligible for treatment as the rich, and the fee being the same in either case, his treatment should be equally painstaking and effective.

The generous doctor's free list would be done away with. Every doctor has more or less of this sort of thing, some very much more than others. Year by year adds new names to the free list, as widows, orphans or helpless cripples come within the circle of his practice. He finds it almost impossible to drop names, and so more and more valuable time is occupied by this work. One cannot deny that this work is essentially necessary and valuable, but that is just the point insisted on. It is necessary to the State and the public, and so the State should be prepared to take the burden from the few, and share it among the many. The difference between work expected of us and ordinary philanthrophic work is, that what we do can only be done by a few individuals possessing skilled knowledge, while ordinary philanthropy can be practised by anybody who possesses a kind heart.

The public being well and easily supplied with medical attendance, quackery would at once be at a discount. The act of registration of a medical or surgical diploma, would place its possessor at the service of the State, unless he expressly demanded to be free from such service; and the Registration Boards could have the power to use their discretion as to the qualification of applicants, as well as to remove from the list of State officers, such as proved themselves incapable of performing the services required of them. The standard of medical work would by this means, be kept up to a high average of efficiency, and the public would get the best possible value for their money. They would certainly be very chary of paying unqualified practitioners, when they could obtain the services of the well qualified free of cost.

It might be objected, that all really clever men would remain in private practice, while only the less competent would go into the Government Service. In reply, I must say, that experience has not shown this in the past, in other matters.

No one will deny that our public vaccinators, and the medical men who are now engaged on active service on behalf of the State, such as colonial surgeons, health officers and so on, are men highly esteemed among their professional brethren; and they willingly accept these positions, partly no doubt for the honour, but also for the certainty of income, without the worry of collecting it; although they could, in

private practice, obtain larger incomes. And also, the Staff of the State Education Department, does not consist of men who have taken up the work, because they were fit for nothing else. Among these various Government servants, there are men who could hold their own with any of their class. And we can safely affirm, that even if some of the very ablest of the medical profession were to remain in private practice, still, a large proportion of talent would enrol itself in the Government Service, from the obvious advantages connected therewith.

ANTHRAX IN AUSTRALIA, WITH SOME ACCOUNT OF PASTEUR'S METHOD OF VACCINATION.

DEMONSTRATION AT JUNEE, N.S.W.

By William M. Hamlet, F.I.C., F.C.S.

Member of the Board appointed by the Government to report on the Junee Demonstration.

The microbe, whose presence and functions are indissolubly connected with the disease known as anthrax, is of greater antiquity than many persons ask us to believe. It is not a creature of yesterday, nor did it come into existence with the advent of either Davaine, Pasteur, or Koch; although, on the other hand, the opinion advanced by some, that anthrax is none other than the murrain amongst the flocks and herds of the Egyptians, mentioned in the Book of Exodus is, I think, a matter of speculation.

It is sufficient here to note, that the historical record in Europe goes back at least to 1782, when Chabert accurately described the disease as a fievre charbonneuse, from the black or charcoal colour of the blood and spleen. His results were confirmed by Gilbert in 1795, and subsequently, by Verheyen; and by Hensinger, who published a valuable monograph on the subject. These were followed by Fuchs, Brauell, Raimbert, and Burgeois—observers who generally agreed as to the parasitic origin of the disease; and by M. Hurtzel d'Arboval, who wrote a complete account of the nature of anthrax. Barthelemy, in 1823, mentions the fact first noticed by him, that the disease is attended with more fatal results in the case of the herbivora, than with the carnivora, proving this by direct inoculation of the animals with diseased blood.

In 1826, the disease appears to have made great progress in Denmark, in Dantzig, and in several of the Prussian States, the probability being that it was introduced there from what was then known as Russian Poland. Gerlach confirmed much of the work of the previous observers in 1845, and showed its identity in both sheep and cattle.

Coming to the year 1847, we find the disease had found its way to Australia. Sheep had been introduced into the country sixty years previously, and the first outbreak of what is clearly recorded as being that of anthrax, is known to have occurred on a farm belonging to Mrs.

Cordeaux, at Leppington, near Liverpool, in the County of Cumberland; and from the county, the disease took its name as Cumberland Disease; while in other parts of Australia, particularly in that part now known as Victoria, it was called the New Disease.

In the time of Governor Sir Charles Fitzroy, a Commission was appointed in 1851, under the direction of Sir Edward Deas Thomson, then Colonial Secretary, from which there seems to have been little doubt as to its identity with anthrax; for the Commission agree in stating, as a fact, that the symptoms, course, and post-mortem appearances of the disease were in all respects,* "similar to a disease long known in France under various names, of which the most common is the maladie du sang," so that it is a clearly established fact, that our early Australian observers recognised the disease at a time when it was only just beginning to be understood in Europe. Indeed, they mention that, so far as they knew, no other British writers had previously described the disease.

In the month of August of 1850 a great step was made, when some blood, taken from animals suffering from the disease, was examined under the microscope by two French physicians, Messrs. Rayer and Davaine. They noticed that, interspersed here and there amongst the corpuscles, there were a number of non-motile rods or filaments, measuring about twice the diameter of a red corpuscle. Davaine was the first to establish the fact, that the disease anthrax was due to a parasite in the blood of the animal. He also proved that the blood, after having been dried and preserved eleven months, still retained its virulence, and was capable of producing fatal results.†

Five years after MM. Davaine and Rayer came Pollender, who demonstrated, quite independently, that anthrax was always accompanied by the presence of the rods or filaments in the blood of the diseased animal; that, in effect, the one was always linked in some mysterious but essential way, with the other.

In 1857, Brauell discovered the rods in the blood of a diseased animal before death. He, moreover, discovered them in the human subject after death.

In 1861 and 1862, Pasteur made known his discovery of the butyric ferment—the bacillus subtilis or amylobacter—and showed that this wand-shaped microbe or bacillus was the sole and active agent in the process of butyric fermentation. This truth was made known to the world by one who little suspected the important results that were to follow. Davaine read and heard of these results with the most lively interest, and became so much impressed with the similarity of Pasteur's bacillus amylobacter with the rods he had found in diseased sheep's blood, that with true scientific inspiration he believed that the clue was now obtained by which the cause of charbon could be ascertained. Davaine's experiments in this direction were the subject of communications made to the Academy in 1863–65–66. By inoculating some sheep with a liquid containing the rods, he thereby produced the disease with its accompanying fatal results, and then beheld the rods or bacilli again in the blood taken from the dead animal.

* *Government Gazette*, No. 69, June 19, 1851, page 938.

† From actual experiment, it has since been shown that the virus may be kept dry, and still retain its virulence, after twelve years.

In 1868, Dr. Burdon-Sanderson was attracted to the inquiry. Again reverting to Australia, we find that in the same year Mr. Gordon, Chief Inspector of Stock in Queensland, became satisfied as to the identity of the anthrax of Europe with Cumberland Disease in Australia. A few months later, Dr. Morris, of Sydney, wrote a very able report on the nature and origin of the disease for Mr. Gordon. In 1873–74, Burdon-Sanderson, who had by this time thoroughly investigated the disease, made a report to the Privy Council, not only embodying all that was known on the subject up to that date, but arriving by experiment at the conclusion, that the contagium existed in two distinct forms—the one visible as transparent rods, the other latent and invisible, or at least, beyond the power of the best microscopes.

The year 1876 proved a most remarkable one in the history of the elucidation of this disease. Mr. Archibald Park, veterinary surgeon, now in Tasmania, but who was then at Mount Gambier investigating the subject, formed his opinion as to the cause of the disease, which was expressed in a letter to one of the Melbourne papers, wherein he attributed the disease to something in the blood, by which a kind of blood-poisoning was set up.

Graham Mitchell was drawn to the subject at the same time, and in a letter to the Melbourne *Argus*, pointed out very clearly that what was known as "Cumberland Disease," or "the New Disease in Sheep," was none other than anthrax, or the splenic fever of Europe. The question attracted considerable notice in Victoria; and Mr. Cosmo Newbery and Mr. Emerson MacIvor were both engaged in analysing the blood of sheep that died of the disease, in consequence of certain statements that were maintained by some, to the effect that a diminished supply or assimilation of the potash in the blood was the *vera causa* of the disease.

In Scotland, Professor Tyndall was lecturing at Glasgow, and, incidentally, not only mentioned the work that was going on in France, but made known for the first time in Britain, Koch's celebrated discovery on the ætiology of anthrax.

Pasteur's brilliant researches on the subject were made about the same time, but published a few months later (1877). The research proved that the bacilli are the direct and active agents in producing the disease. In the same year, Professor Cohn, of Breslau, carefully repeated Koch's work, and gave it his valuable support and confirmation. In 1881 came the discovery of a protective vaccine by Pasteur, who, associated with Chamberland and Roux, were the originators of the method of protective vaccination against anthrax.

At the same time, and during the two years that followed, Drs. Klein and Greenfield investigated the subject very fully, and reported on the method to the Local Government Board.

Historical Summary.

First outbreak in Australia	1847
Rayer and Davaine's discovery of the rods	1850
Commission appointed in Australia to investigate the disease	1851
Similar one in France (Conference Eure et Loire)	1852
Pasteur's discovery of the butyric ferment	1861
Davaine's renewed attack on the subject	1863

Koch's discovery of the life-history of the bacillus ...	...	1876
Pasteur and Joubert's independent discovery of the same	...	1877
Pasteur's discovery of the vaccine of anthrax ...	...	1881
First public demonstration in France	...	1881
Second do. do. do.	...	1881
Third do. do. in Germany	...	1881
Fourth do. do. in Australia	...	1888

There can be no doubt, that what was known over forty years ago as Cumberland Disease, and diagnosed at the time as the French maladie du sang, is identical with the disease bearing that name, known likewise as splenic apoplexy, or anthrax; so that, after all, the term Cumberland Disease is but the Australian synonym for this disease. The work of the Commission in Governor Fitzroy's time seems to have remained forgotten and unheeded until Messrs. Archibald Park and Graham Mitchell* took the subject in hand. The latter had carefully observed the disease, and pronounced it to be identical with European anthrax.

Mr. Anthony Willows reported to the Government, in 1883, confirming the diagnosis, and giving full details of a particular outbreak on the Lachlan.† Mr. Willows was the first to advocate vaccination as a protection against the disease. This report was followed up by Mr. W. E. Abbott, of Wingen, N.S.W., who, in a letter to the *Sydney Morning Herald*, April 3, 1883, also recommended Pasteur's method of protective vaccination. Two years afterwards, Mr. Edward Stanley, Government Veterinarian, in reporting on an outbreak in the Narandera district, became favourably impressed with Pasteur's vaccination method; but Mr. Alexander Bruce, Chief Inspector of Stock, could not, in the absence of full information on the subject, recommend any definite action to be taken in the matter until April last, when the representatives of M. Pasteur arrived in Australia, to deal with the rabbit plague. Those of us who were interested in the investigation and suppression of Cumberland Disease, saw the favourable opportunity afforded of satisfying the public as to the identity of Cumberland Disease with European anthrax, as well as to test the efficacy of vaccination as a preventive measure.

Accordingly, Dr. Germont, M. Loir, and Dr. Hinds, visited Uarah Station, and saw a sheep that had just died of the disease. As the result of their examination, they unhesitatingly pronounced the disease to be the same as that known in France as maladie du sang, charbon, sang de rate, &c.—a valuable confirmation of the opinions of the most acute observers ever since the disease first made its appearance in Australia.

Through the indefatigable energy of the Chief Inspector of Stock, some attenuated virus of vaccine was obtained from M. Pasteur, and arrangements were made to have it tested officially, and in as public a manner as possible, upon a number of sheep. A Board was appointed by the Government to watch and report upon the experiments to be

* "Cumberland Disease (the so-called 'New Disease') in Australian Sheep." Melbourne. Published by Alexander M'Kinley and Co., 1877.

† Anthrax (Cumberland Disease). Report by Mr. Anthony Willows on the Prevalence of Anthrax in the Lachlan District. Sydney, 1883.

made by Dr. Germont and M. Loir, to demonstrate the efficacy of Pasteur's vaccine. The Board consisted of:—John de V. Lamb, Esq., Chairman Board of Sheep Directors, Sydney; Arthur A. Devlin, Esq., Chairman Board of Sheep Directors, Narandera; Alexander Bruce, Esq., the Chief Inspector of Stock; Edward Stanley, Esq., the Government Veterinarian; and the Government Analyst.

My connection and interest in the subject of this paper began in 1884, more particularly in regard to a popular theory as to the cause of the disease, namely, the poison plant theory. The idea prevailed in the minds of the majority of the stock-owners in the colony, that one or more poisonous plants were the sole causes of the disease—an impression that still lingers in some parts of the country. Squatters and stockmen alike agree in attributing the disease to the plants or herbage the sheep may have eaten. Stock passed over a given country, and became smitten by some insidious disease, and died in large numbers. The readiest hypothesis, with many people, was to attribute it to noxious weeds, and large numbers of specimens of all kinds of plants were submitted both to the Government Botanist for identification, and to the Government Analyst for examination and analysis. But these steps failed to clear up the mystery, whilst direct practical tests with the plants on the sheep themselves gave no support whatever to the theory.

Mr. Charles Moore, in summing up his report on the question,* says:—"If the sheep and cattle disease, commonly called Cumberland Disease, be caused by one or more plants, it is not as yet possible to determine with accuracy what these plants are."

So many samples of plants having, moreover, been analysed by the Government Analyst during the past seven or eight years, without tracing any poisonous principle or alkaloid, my interest became aroused, and I requested Mr. Stanley to provide me with large quantities of the fresh ripe plants, both in flower and in seed, particularly of the plants alleged to be poisonous. In this way, such plants as *Croton verrauxii*, *Omalanthus lesche*, *Euphorbia drummondii*, various *Swansonia* (Darling Pea), and many others were exhaustively dealt with, but without discovering any poison whatever by chemical analysis.

Although no actively poisonous principle could be detected, yet I am of opinion that certain classes of plants are indirectly associated with the ætiology of the disease; some probably acting as a suitable host in the development of the parasite, while others, such as the different varieties of thistle, or hard, fibrous, or spring species of plants, are apt to set up sufficient irritation in the mucous membrane of the intestinal tract, as to afford the microbe a sure and ready means of ingress into the system. Pasteur made some interesting experiments in this direction. He found that food that had been infected with virulent virus of anthrax was not always fatal to sheep, and that the majority of the sheep so fed *did not* contract the disease. But on mixing virulent virus with dry barbed ears of barley, oats, thistles and chaff, the mortality rose at once to eighty and ninety per cent., proving beyond all question that the abrasion and irritation of the alimentary organs, caused by the sharp points of the plants, at once gave the

* "Votes and Proceedings," 1858–59, p. 8.

necessary conditions, and placed the animal in reach of the disease. Mr. Willows* said that "much of the grass of the Lachlan district I found to be very penetrating, hard, and fine in its fibre, and the terminal extremities of the seeds of this grass were quite prickly in many instances. I also observed that many of the sheep were in the habit of feeding upon thistle seeds."

Again, other plants, like *Euphorbia drummondii*, spread their leaves quite close to the ground, so that a sheep could scarcely nibble it without taking up some of the earth along with it, and in this way a large amount of infected matter from an infected soil could be introduced into the system. The milky fluid expressed from *E. drummondii* in the fresh state contains no poisonous principle, but would become a suitable medium for the growth of the bacillus, and hence there may be some ground for the suspicion held by shepherds against this plant—a suspicion very widespread, and dating back from the time of the early days of the colony.

Of other possible sources of contagion, may be mentioned dingoes, crows, and flies.

The rod-like microbe first described by Davaine, which is the cause and origin of anthrax, is a minute thread or staff-shaped cell named bacillus anthracis (baculus, a wand or staff, and *ανθραξ*, coal or charcoal). It lives and propagates itself in contact with air, or an equivalent quantity of oxygen, in almost any albuminous or proteid-laden solution; but most readily in the blood of a living animal, where it does great mischief, living at the expense of the serum, and producing a chemical change in the hæmoglobin. This change is brought about by the microbe appropriating the oxygen introduced during the respiratory process of the animal, and reducing the hæmoglobin, giving at once the black or purple-black tint common to venous blood. The hæmoglobin has its oxygen-carrying functions disturbed; the chemical change set up being analogous to asphyxia. For this reason, the earlier French observers named the disease charbon; while in Germany it is called milzbrand—burnt spleen, hence the term anthrax.

A drop of such blood taken from a diseased sheep, and placed under a cover glass, and an eighth Zeiss-immersion, or other good lens, will reveal the presence of the transparent, non-motile glass-like rods amongst the corpuscles. At the same time, the corpuscles will have lost much of their sharply-rounded outline, some of them becoming agglutinated together in masses or groups, dotted here and there over the field of the microscope. The microbe grown in different animals present slightly different sizes, sometimes being found somewhat thicker, and with more rounded ends.

It is found in nature in the bacillus or staff-shape, and sometimes in long hair-like filaments. These, under certain conditions, become filled with spores, like a chaplet or a string of beads. The spores elongate, and develope into the full grown bacilli.

Thus we have, in the life-cycle of the microbe—spores, bacilli, and filaments, and so on. From measurements I have made, the spores are uniformly one and a half millimetres long and three-quarters to eight millimetres thick, and appear as bright shining dots under the micro-

* Op. cit.

scope. The bacilli vary from four to ten millimetres in length, and from one to one and a quarter millimetres in thickness, being slightly thicker at the extremities. Where Klein, Crookshank, and some others give twenty millimetres as a maximum of length, I think it is probable that two microbes have been measured while they were joined end on to each other, or that the bacillis was measured in the incipient filament stage.

The same remarks apply to *B. subtilis*, which closely resembles *B. anthracis*. Filaments grow in the most fantastic forms, to great length, and are practically immeasurable, owing to their hair-like appearance.

In working with this subject, spores are only observed at certain stages of cultivation, and filaments are mostly found in cultures, but rarely in the œdema at the seat of inoculation in an infected animal; while the bacillus itself, in lengths of from four to ten, and even eighteen millimetres, is generally met with in the blood, spleen, and tissues of an animal that has succumbed to the disease.

The spore-form is the most stable and persistent stage in the existence of this microbe, and owing to the enormous powers of endurance of the spore, through a wide range of temperature, it is possible to account for the appearance, disappearance, and re-appearance of the disease, at times and in places otherwise quite unaccountable.

Spores may be dried up to an impalpable powder, and preserved for many years, and even subjected to a comparatively high temperature, without losing their vitality. They appear to survive (although remaining, of course, quite inactive) a temperature below the freezing point of water, and likewise resist a temperature of 220° Fahrenheit. To be quite sure of their destruction, a temperature of at least 260° Fahrenheit is to be recommended.

NOTE.—A temperature of the boiling point of water is sufficient to destroy the bacilli recently obtained from an infected animal, and hence the knives and instruments used in dissection may be completely disinfected by plunging them into boiling water. Towels, &c., may be thus cleansed at a temperature of 212° Fahrenheit. The most convenient disinfectant is a hot three per cent. solution of sulphate of copper.

To obtain a pure cultivation of the *B. anthracis* (*i.e.*, a virulent virus), take a piece of glass tubing eight inches long and three-sixteenths of an inch in diameter; draw it out in the blow-pipe flame to a capillary tube; divide into two by holding again in the flame, taking care to seal both ends; insert a tuft of cotton-wool in the wider end. The tubes are then to be sterilised, by heating in an oven to 260° Fah., discontinuously, for half an hour on three consecutive days (Tyndall's method).

On exposing the heart of an animal just dead from the disease, slit open the pericardium, and apply a cautery to any part of the organ. Insert the point of the tube, which must have been just drawn through a spirit-lamp flame; break the point *in situ*, and aspirate some of the blood; close the point by fusion in the flame, and the tube is ready. A drop of this blood, placed in about two ounces of neutral meat extract (bouillon) sterilised previously by heat, kept in contact with air, but protected by a tuft of cotton-wool, and then placed in an incubator and maintained at a temperature of 95° Fah. for forty-eight hours, will

yield a good crop of the *B. anthracis* in a state of purity. This is, to all intents and purposes, a cultivation of virulent virus.

It is not absolutely necessary to maintain it exactly at 95°, as the bacillus developes very well between 85° and 104° Fah., the temperature of a sheep being 103° Fah. At 125° Fah., the bacillus is killed; but then, as I have mentioned before, it is necessary to raise the temperature to 260° to be sure of killing the spores.

A culture grown in this way will be found full of bacilli. Allowing the culture to remain a day or two longer, the bacilli assume the filament stage, and in a few days more this becomes visible to the eye as a cloud or cluster of very fine filaments, which at last falls to the bottom in a compact mass.

The formation of spores goes on between 64° Fah. and 109° Fah. Below and above these temperatures, their birth and evolution is hindered or prevented. Spores, however, *exist* both below and above these points — in fact, below freezing-point, and above the hottest recorded Australian temperature. Bearing this in mind, it is not difficult to cultivate the bacillus in a medium so that only adult bacilli shall be present, the spore growth being prevented, and altogether kept in check.

A cultivation of this kind, which has been maintained for some days at the spore-preventing temperature (107° to 109°) will become, as it is called, attenuated; that is to say, it gradually ceases to possess virulence, and at one particular stage, possesses the property of protecting animals against the virulent virus of anthrax. Its injection under the skin of a sheep will set up a mild form of the disease, and become a protection against the worst form of the malady. As age increases, the virus gradually loses even this property, and finally, becomes inert. Not so with the spores, whose vitality, on the other hand, is maintained for years, even when dried to a fine dust.

After a culture has been maintained in a liquid medium for several weeks, and the microbes have been deposited as a silky tuft at the bottom of the flask, the upper layer of clear limpid liquid may be filtered off, and upon injecting a sheep with this clear liquid, the sheep will not contract the disease; whereas, if some of the filament or cloud be mixed with water, and injected under the skin, then all the symptoms of anthrax appear, showing that it is the microbe *B. anthracis*, and it alone, that is the cause of the disease, the microbe and its spore being the true *contagium vivum*. It is well known that an animal having once survived an attack of the disease, becomes insusceptible to a second attack; for it has been observed over and over again, that some sheep do not take the disease at all, even where numbers from the same mob die around them. It is highly probable that such sheep are spontaneously protected, having had the disease in a benign form; they become, in fact, inoculated, are are thus able to resist the introduction of the microbe. This resistance has been noticed in France and in Algiers. However we may account for this phenomenon, we may call it natural immunity or resistance, in contra-distinction to artificial vaccination, which I am about to describe.

To Pasteur belongs the honour of having discovered the means whereby an animal, susceptible to anthrax, may be protected when placed in contact with the disease, and under circumstances when

infection is certain to occur, or even when the animal is directly inoculated with the deadly virus of the disease. The discovery of immunity by artificial means was first discovered in the case of chicken cholera, and the method became the basis or touchstone for general methods of protection in the case of other infectious diseases. In making known his process at the International Medical Congress, held in London in August 1881, Pasteur said:—"J'ai donné à l'expression de vaccination une extension que la science, je l'espère, consacrera comme un hommage au mérite et aux immenses services rendus par un des plus grande hommes de l'Angleterre, votre Jenner. Quel bonheur pour moi de glorifier ce nom immortel sur le sol même de la noble et hospitalière cité de Londres!"

Vaccination against anthrax is accomplished by injecting, hypodermically, four minims of an attenuated virus of a known strength, obtained by cultivation from the blood of an animal suffering from the disease. A mild attack of the disease is set up, not enough to produce any discomfort to the animal, imperceptible indeed, except for the rise in temperature observed in the animal. The increase being from 103° normal sheep's temperature to 105°, or perhaps 106°. This constitutes the first vaccination, and of itself, is not sufficient to ensure the certain protection of the sheep or cattle. A second vaccination is found necessary, which is performed some fifteen days after the first. This time, the attenuated virus is of an increased strength (vaccine No. 2). The same quantity of vaccine is used, and the inner part of the thigh is selected for the purpose of vaccination.

The observed increase of temperature is less than in the case of the first vaccine, except in those cases where there was no increase at first, and then a greater rise is always observed. In practice, the rule is found to be—increase of temperature with No. 1 vaccine, gives little rise with No. 2; whereas, a little or no rise with No. 1, gives a greater rise in the case of No. 2 vaccine.

After the second vaccination, the sheep are protected, and possess extraordinary powers of resistance. They may be inoculated with the most deadly virus; they may be inoculated with the blood taken, still warm, from a sheep just dead of the disease, with absolutely no effect. They may be placed in a pen of sheep that are dying and dead from the disease, without the slightest effect. They may also be fed with infected food, and live in infected paddocks, without taking the disease, and finally, they may be fed on infected food mixed with chaff, thistles and hard fibrous plants, and never become infected. This immunity is found to last for twelve or eighteen months—sufficient time to enable a flockmaster to safely pass through a season.

The susceptibility in various animals has been ascertained. In man, the disease is called wool-sorter's disease, or malignant pustule; and wool-sorters, shepherds, butchers, fellmongers, ham-workers and tanners, are the most likely to suffer from its effects. Horses frequently become infected, but in varying degrees, and in different countries. Cattle take the disease very readily, but it is not always fatal. Pigs and dogs are not usually susceptible, but if the former be fed on the offal from the carcases of diseased animals, they have been known to become infected. Cats rarely take the disease, and birds never, except when inoculated, and even then, but seldom. Rats do not become easily infected. Sheep,

mice, guinea pigs and rabbits, are all readily susceptible; the greatest known mortality being amongst sheep.

When Pasteur, Chamberland and Roux made known to the world in 1881 that sheep and cattle could be protected against anthrax, agriculturalists, veterinary surgeons and stock-owners were incredulous, and looked for a sign or proof in short, nothing less than a practical demonstration in the eyes of the public was deemed satisfactory. The question asked was, would it stand the test of practical experience in the field?

The first public demonstration was made in France, near the town of Melun, on a farm known as Pouilly-le-Fort, on Thursday, the 5th of May, 1881. Fifty sheep were obtained for the experiment; twenty-five of which were to be vaccinated by Pasteur, while the other twenty-five were to remain unvaccinated. At the suggestion of one of the committee, a goat took the place of one of the unvaccinated sheep, making twenty-four sheep and a goat for the unprotected series. The entire lot of fifty animals were afterwards equally infected, vaccinated and unvaccinated, alternately one after the other, every one of the forty-nine sheep and one goat being inoculated with a virulent virus. On Thursday, the 2nd of June, a great crowd assembled to witness the results. In from forty-nine to fifty hours after the inoculation, the four and twenty sheep and one goat that had not been vaccinated were all found to be dead—the post-mortem examination showing that anthrax had been the cause of death; whilst the twenty-five vaccinated sheep remained alive, and were found in a sound healthy condition.

Some members of the medical profession who witnessed the demonstration, took notice of the fact, that Pasteur used a virulent virus that he had himself provided—a circumstance that left some degree of doubt in their minds. Wishing to have the most vigorous proof that it was possible to obtain, another commission was formed to request Pasteur to repeat the demonstration, all of the conditions to remain the same, except one, namely, that the virus to be used should be the blood taken direct from a sheep recently dead from the disease, and forthwith used for the inoculation.

This request was unhesitatingly complied with, and the second demonstration took place at an estate known as Lambert's Farm, near Chartres, in Normandy. Again fifty sheep were submitted to the same routine—half of them were vaccinated, the other half remaining unvaccinated. On the day of the final results of the demonstration, and in the presence of a large number of persons, everyone of the sheep underwent the ordeal of inoculation, with blood from a sheep that had just died from the disease. The results were an unqualified success, to the satisfaction of all the spectators; being in fact, identical with the trial at Pouilly-le-Fort. Every one of the unprotected sheep died in forty-eight hours, while those that had been protected, remained alive and well.

When Koch heard of Pasteur's discovery of the vaccine, and of the demonstrations in France, he said, "it was too good to be true," and shared the scepticism, common amongst the German doctors, as to the truth of the fact. Anthrax being common in Germany, as well as in France, it was not long before Pasteur was asked to come and protect

the German sheep. His reply was, "seeing the discovery is so warmly contested in Germany, let there be a demonstration, such as we have had in France." Accordingly, Dr. Roloff, of the Royal Veterinary School at Berlin, applied to the Minister for Agriculture, and a Commission was appointed. Pasteur sent M. Thiullier to go and undertake the vaccination and inoculation, in the manner adopted at the French demonstrations. The trial came off in the presence of the celebrated Professor Virchow, Herr Beyer being President of the Commission.

The demonstration took place that same year, on the Packisch Estate, in the Kreis Liebenwerda, Merseburg, in Saxony. The programme was practically the same as that at Chartres—diseased blood being used for the inoculations. The success of the demonstration was beyond all question, the full report being published in the *Archiv für Wissenschaftliche und Praktische*, Thierheilkunde von Roloff Müller and Schültz, Berlin XIII., Band 3, Heft s, 230, under the title, "Milzbrandimpfung in Packisch."

In April 1886, another series of practical experiments were made on the efficacy of Pasteur's vaccine, when the question as to the necessity of the second vaccination was raised. This was tested at Reit Nordhausen and at Kelba, when it was found that if the vaccination be properly carried out—first and second vaccination—the method is successful in protecting stock from anthrax; but in the case of cows that had only received the first vaccination, and were not thus fully protected, two died of the disease, showing, as Pasteur has pointed out, that the two vaccinations are really necessary ("Jahresbericht über die Verbreitung von Thiersenchen im Deutsche Reiche," Berlin, 1887, Milzbrand, p. 12).

After the Packisch demonstration, Koch admitted the success of the method, and openly stated it to be an excellent thing. He subsequently published his own researches confirming the fact, and announced his own independent discovery of an attenuated virus or vaccine, giving the method by which he arrived at his results ("Mittheilungen aus dem Kaiserlichen Gesundheitsampte," Band. III., Berlin, 1885).

The next demonstration, which has special interest for Australians, took place at Junee in New South Wales, the Board already mentioned having been appointed to watch and report upon the efficacy of the vaccine, and to report thereon. The plan of the demonstration was the same as the one made at Pouilly-le-Fort seven years ago, and by permission of T. W. Hammond, Esq., the experiments were made on his run, distant about a mile from Junee Railway Station. Arrangements were made so that one member, at least, of the Board should be on the spot, and in constant attendance, during the whole of the time the experiments were in hand. Watchmen were kept day and night to look after the stock-yard and sheep-pens, until the demonstration should be concluded.

On the 4th of September, twenty sheep and four head of cattle were submitted to the process of first vaccination by Dr. Germont. The part of the animal selected was the inner side of the right thigh. The surface was first washed with water, containing a few drops of carbolic acid, and about two minims of the vaccine injected under the skin by means of a small sterilised Pravaz syringe. Temperature of the sheep registered

103° and 104° Fah. In forty-eight hours the temperature rose about 3°, gradually falling to the normal.

On the 18th of September, the same lot of twenty sheep, which had been marked and kept under supervision during the interval, were again vaccinated by Dr. Germont for the second time, the general rise in temperature amounting on an average to 4°. The inoculation was arranged to take place on the 2nd of October, the sheep being timed to die during the afternoon of the 4th. To roughly distinguish the sheep, the vaccinated ones were left with their wool on, while the unvaccinated sheep were shorn. The blood used for inoculation was taken direct from the heart of a sheep that had died of Cumberland Disease, or anthrax, its history being as follows:—In May last, a sheep died from anthrax at Uarah Station, contracted in the usual way in an infected country. Some of the blood of this sheep was removed by Mr. Stanley, Government Veterinarian, and kept in the office of the Chief Inspector of Stock until the 13th of September, when it was handed over to me to test its condition and virulence. As showing that the virus had lost none of its vitality, two sheep inoculated died on the following day, thirty-two hours after inoculation. Blood from one of these sheep was still retained in my possession under lock and key, and a pure cultivation of the same made and taken to Junee on the 29th of September. With some of this virus a sheep was inoculated, so as to die just about the time when required for the inoculation of the total number of sheep intended to be used for the demonstration. The sheep died on the 2nd, and the inoculation of the thirty-nine sheep proceeded with; the blood, therefore, was not obtained from, nor manipulated by, Pasteur's agents in any way whatever. Nineteen healthy sheep were let loose into the same yard with the twenty vaccinated sheep; the whole thirty-nine were then inoculated alternately, with two minims of blood, obtained direct from the sheep that had just died from anthrax.

The results were clear and unmistakable. In a period averaging forty-eight hours (maximum 60, minimum 27) every one of the nineteen unvaccinated ones died, while the twenty vaccinated sheep walked about amongst the dead carcases, eating food that was contaminated with the sanious discharge from the diseased animals, and standing amid the effluvium of the dead and diseased, unhurt, and in perfect health.

Of the cattle, four were vaccinated on the 4th and 18th of September, at the same time and place. Two additional unvaccinated ones were obtained, and turned in the yard with the others, and all six were inoculated just after the sheep.

Results.—One of the unprotected cattle died, and the other recovered, after severe illness. The four vaccinated animals showed no sign of inconvenience from the inoculation.

The Australian Commission, appointed in the year 1851, in their Report, in view of what appeared to be the hopelessness of any cure for anthrax, recommend the following rules:—

(1) That sheep, cattle, or horses, which have travelled through, or rested in places where others have died from this disease, be kept separate from all others for a few days (say fourteen), in order to discover whether any have caught the contagion.

(2) That when any one dies, its body should be consumed by fire on the spot where it is found.

(3) That if moved for the purpose of being more conveniently burnt, the body should not be dragged along the ground; and the spot on which it has lain should be chopped up, and scorched, by making a fire on it.

(4) That consuming the body by fire is better than burying it.

(5) That travelling stock should, if possible, avoid every resting place where any animal has died of the disease.

(6) That some means should be devised to keep the highways clear of dead bodies.

(7) That a place should be provided in the suburbs of Sydney, to which animals dying in the city, of disease or accident, could be taken and burnt.

One cannot but admire the thoroughly practical and efficacious methods suggested by these pioneers, for looking back at our progress, one can safely say that (vaccination excepted), no better means of prevention could have been adopted in cases of epizootic anthrax, even after thirty years of scientific advancement.

When an animal dies of anthrax, the carcass should be completely destroyed by fire. If buried, the ground will ever afterwards be infected, unless, perhaps in the case of a bush fire passing over it. Pasteur proved, that the long continued state of infection of certain soils, was due to earth worms, and although the idea was criticised and opposed by Koch, yet the show of reason lay on Pasteur's side. The matter yielded at last, to a practical experiment. The carcass of a sheep was buried in a certain paddock, and the grave was fenced all round, after some time, the grass having grown on the spot, some sheep were folded upon it, and everyone of these sheep died; whilst in the case of a number of sheep placed in an adjoining paddock, not one were affected in any way.

There is little doubt that anthrax was imported into Australia from France and Germany. In 1797, Captain John Macarthur introduced the merino sheep, to cross with the hairy-woolled animals then existing in the Colony. Dr. Lang, whose memory is still green amongst us, and whose statue is now being erected in Sydney, speaking of the efforts of Macarthur in improving the breed of sheep, said :—

"The obligation under which he has consequently laid the Colony in all time to come, through his unremitted perseverance, and unexampled success, are great beyond all calculation."

Some of the sheep breeders since Macarthur's time do not appear to have had the best interest of the country at heart, according to Robert Meston, who, in a report presented about that time to the Legislature of New South Wales, says :—"The most energetic attempts have been made in general to upset the good work of Captain Macarthur, justly called the first. Every petty state of Germany was hunted over for the purpose of obtaining sheep with fine wool and weakly constitutions, further to corrupt the remaining true merino blood of this colony." After describing some of the alleged causes of disease amongst the sheep of the colony, and the tendency of some stockowners to sacrifice everything to quality and texture of the wool, he recommends that a Professorship of Agriculture and Pastoral Pursuits should be established in the colony, and he concludes by urging preventive, rather than

remedial measures against the diseases of sheep, a consummation towards which the Junee Demonstration is, I think, the latest and most valuable step hitherto made. Hence the introduction of the Rambouillet sheep, and the heavy fleeces of Germany, have not been without their attendant disadvantages and losses to the squatter and pastoralist, who have to reckon with their insidious foe, charbon or milzbrand.

Losses sometimes occur through imperfect manipulation during the process of vaccination; for unless sanitary and efficient antiseptic precautions are observed, septicæmia may be set up, or the animal may die from other causes. In practice, the loss attendant upon vaccination amounts to one per cent. for sheep, and half per cent. in the case of cattle.

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A NOTE ON PASTEUR'S METHODS.

By M. Crivelli, M.D. Paris.

In glancing at the programme of communications for the Congress, I noticed that Dr. Wigg was going to read a note on Pasteur's methods.

Having had the pleasure of meeting Dr. Wigg, I heard he was going to combat principally the remedy against rabbits, and the treatment of hydrophobia.

I mark with pleasure, that Dr. Wigg does not intend to attack Pasteur's work on Cumberland Disease, and its vaccination—a discovery now universally adopted, which no one doubts, and the efficacy of which Drs. Germont and Loir have shown in such a conclusive way a short time ago in New South Wales.

Firstly, as regards Pasteur's remedy against the rabbit pest, I regret that I have not time to complete any long and scientific work, or to look up all the documents about the microbe of chicken cholera, that I would like to give you. Also, I cannot here undertake a technical discussion. I cannot however accept, and I must protest, when I am told that the experiments made in Australia are a failure, when they have succeeded a number of times all over the world.

After waiting and talking for six or seven months, these experiments were at last allowed to be made, and everyone has in mind the success which *The Argus* recorded. All the rabbits on the small island on which the experiments were made, were destroyed, whilst none of the other animals contracted the least indisposition.

The disease produced is so little contagious, that Drs. Germont and Loir offered to eat the flesh of some animals inoculated with this microbe. The contagion affects rabbits, and in no way does it affect other animals. It was said that birds were liable to take it. This has not been proved, at any rate in the case of fowls. Does it not remain a fact, that the rabbits were destroyed, as was announced? Why are complementary experiments not undertaken? For more than eight months Pasteur's delegates have been here, ready to perform all the experiments which they may be asked for, and certainly quite willing to try and convince all who have doubts.

Secondly, in reference to hydrophobia.—I have here sufficient proofs to convert Dr. Wigg, and I hope he may be convinced. I do not argue, but bring figures and facts. That recovery from hydrophobia does occur, is everywhere admitted. The most incredulous have, after a careful study, been convinced, and there are now branch establishments of Pasteur's Institute in nearly all parts of the world.

There is only one celebrated detractor of Pasteur—Professor Peter. Dr. Wigg has read Peter's criticisms, which are based, on I do not know what statistics, which have been falsely given. I regret very much that Dr. Wigg is not in possession of all the discussions which took place at the Academy of Medicine of Paris on this subject, and at which Peter's arguments were completely and surely destroyed, one after the other, and himself reduced to silence. In one or other of the many and keen scientific discussions that have taken place on this subject, every argument has been employed for and against anti-hydrophobic vaccination —its adversaries declaring it useless or dangerous; its partisans proclaiming it inoffensive and wonderfully useful. The battle, after being stopped for some months, was resumed in Pasteur's presence, when presenting the report of the English Commission to the Academy. This official commission, composed of the first scientific men of England, and of a young and clever physiologist, Mr. V. Horsley, as reporter, went to Paris full of incredulity. After a careful inquiry into the facts, this commission returned to England, and repeated Pasteur's experiences for more than a year; the conclusion being, to the great disappointment of his adversaries, that "M. Pasteur had discovered a preventive method for hydrophobia, comparable to that of vaccination against small-pox." This is a quotation from their report!

There are now in the world more than twenty anti-hydrophobic institutes. Besides those in Paris, there are seven in Russia:—Odessa, St. Petersburg, Moscow, Varsovia, Charkow, Samara and Tifflis, and five

in Italy :—Naples, Milan, Turin, Palermo and Bologne (these last two recently created and endowed by the King). There is one in Vienna, one in Barcelona, one in Bucharest, one in Buenos Ayres; and, to conclude, in Chicago and Malta two new laboratories are being organised.

The Anti-hydrophobic Institute of Paris is in constant relation with all these laboratories, the directors of which have all studied Pasteur's method at Paris, so as to apply it to their patients with all its progressive improvements.

I will now give you the official statistics of the Pasteur Institute since its opening, as embodied in the report which was read before the President of the French Republic, at the inauguration of the new Institute :—

From the first, the patients have been classified in three classes, A, B, C.

The Class A contains all the patients which have been bitten by animals, known by certain proofs to be absolutely mad.

In Class B are those bitten by animals stated to be mad, by certificate from veterinary surgeons. It is the frame the most filled.

Lastly, Class C is for patients bitten by animals supposed to be mad. Suspicion here is based on the circumstances of the accident.

The number of people treated in Paris, in the years 1886-1887, and for the first half of 1888 is 5374. In 1886, when strangers were numerous, there were 2682 people inoculated, 1778 people in 1887, and 914 up to the 1st July, 1888. The mortality, counting all the deaths, including even those taken ill the day after treatment is—For 1886, 1·34 per cent.; for 1887, 1·12 per cent.; for 1888, 0·77 per cent.

Foreign statistics are in accordance with those of Paris. In St. Petersburg, in the laboratory founded by His Imperial Highness, Prince Alexander of Oldenburg, and endowed by him, there have been, from the 13th July, 1886, to the 13th September, 1888, 484 patients; the mortality numbering 2·68 per cent. From information given by Dr. Kraiouchkine, this mortality is explained by the extreme gravity of the bites.

In Odessa, in the laboratory managed by Professor Metchnikoff, Dr. Jamaleia has vaccinated—In 1886, 324 patients, by simple treatment; mortality, 3·39 per cent. In 1887, 345 patients, by intensive treatment; mortality, 0·58 per cent. In 1888, 364 patients, by the intensive treatment; mortality, 0·64 per cent. During these three years, 1135 patients have been submitted to the anti-hydrophobic treatment, with a mortality of 1·41 per cent.

In Moscow, at the Anti-hydrophobic Institute, founded under the patronage of Prince Dolgorovtow, there have been vaccinated—In 1886, 107 patients, by simple treatment; mortality, 8·40 per cent. In 1887, 280 patients, by intensive treatment; mortality, 1·27 per cent. In 1888, 246 patients, by intensive treatment; mortality, 1·60 per cent.

At Varsovia, M. Bujivid inoculated 297 patients by simple treatment, the mortality being three per cent.; 370 patients by the intensive method, mortality till now, *nil*. Already sixteen months have elapsed since the first application of this method, and two months since the treatment of the last patient.

In Samara, Dr. Parchenski vaccinated fifty-three patients, of whom four were bitten by wolves. The mortality here (very high, 5·67 per cent.), is explained by the fact of the treatment not being sufficiently energetic and kept up, as explained by Dr. Parchenski.

At Charchow, probably for the same reasons, but without knowing precisely, Dr. Protopopoff vaccinated 233 patients, with a mortality of 3·80 per cent.

In Milan, Dr. Baratieri vaccinated 335 patients; two are dead, notwithstanding the treatment. Mortality, 0·60 per cent.

In Palermo, Professor A. Celli vaccinated, from the 1st of March to the 30th September, 1888, 109 patients, without one failure.

In Naples, Professor Catani, assisted by Drs. Vestea and Zagari, was forced to close his laboratory, not receiving any income from the municipality from January till August, 1888. In that town, Pasteur's numerous adversaries, notwithstanding a vote of confidence and encouragement from the Academy, had succeeded in shaking public opinion, and in disposing the municipality against Pasteur's method. But during this period of seven months, nine deaths by hydrophobia having occurred in Naples, the municipality agreed to give an endowment. The Government and the province of Naples also promised some help, and the laboratory has been opened once more; it is now in full working order. Two hundred and forty-six patients have been vaccinated in Naples—199 since the opening of the laboratory (22nd September, 1886) till January 1888, and thirty-four since its re-opening. Mortality after vaccination being 1·5 per cent.

In Havanna, in the Anti-hydrophobic Institute of Dr. Santos Fernandez, Dr. Tamayo inoculated 170 patients, amongst whom fifty had been bitten by animals proved undoubtedly mad. Mortality being 0·60 per cent.

In Rio de Janeiro, at the vaccinating station due to His Majesty the Emperor of Brazil, Dr. Ferreira dos Santos vaccinated fifty-three patients. Up to date, there have not been any failures.

The foregoing statistics are official. I have the documents in hand. Other statistics I do not admit. After enumerating these results, I do not add any commentary. They furnish the most eloquent answer to the detractors of the Pasteur method, for no one can demolish them.

I will conclude by saying, that I hope Australia may be always privileged, and continue to be kept free from hydrophobia by the severe measures which do honour to its legislators. But, should there be any hydrophobia here, I am confident Australia would not allow herself to be surpassed by all the other nations, and that there would be a branch of the Pasteur Institute established here; and I prophesy of Dr. Wigg that, knowing his love of truth and his professional integrity, he would be amongst the first to vaccinate his own patients.

IS CHOLERA QUARANTINE SCIENTIFICALLY SANCTIONED?

By K. R. Kirtikar, M.R.C.S. Eng., L.R.C.P. Lond.

Surgeon H.M. Bombay Army. Civil Surgeon, Thana.

India has been the home of cholera for ages past. India's commercial relations with England, I may even say with Europe, are daily getting stronger and stronger. The wonderful speed with which steam communication between the two countries takes place, has rendered the transportation of infectious and contagious diseases from India to Europe more frequent. The chances of the introduction of cholera, therefore, from the one country to the other, are daily increasing. India is never free from cholera throughout the year, or at any rate, at some part of the year. In some part of the country or other, there is cholera present, either in an epidemic, or a sporadic form.

When we remember the formidable nature of this disease, it is but natural that there should be a strong desire on the part of the authorities who regulate the international communication of the different countries, that the disease should not only be kept at arm's length, but stamped out; that the ships from Indian ports, coming from an infected locality, should not be allowed to be the importers of cholera into the harbours which they touch. Eight days' quarantine, or ten days' quarantine, is sometimes enjoined. This has been considered by some not so much as a hardship, and as an infringement of one's rights, on account of ignorance on the part of the advisers of the respective authorities enjoining the quarantine; nor even so much as a personal grievance, but, what is most ridiculous, a practice not borne out by the most advanced and accepted scientific principles of the day. It will be my purpose to show this to you briefly.

It must be remembered, that cholera is a protean disease—insidious and sudden—as sudden in coming, as it is in departing. No two epidemics are alike, and each man who observes it clinically, observes it as he finds it. Writers have therefore differed most materially sometimes, and this is the reason why the true etiology of the disease is buried in so much mystery.

In India, the cholera question is looked at from two points of view. We have what I would call the sceptics, or as Dr. de Chaumont calls them Nihilists, who think, and very rightly too, that the true cause of cholera is unknown. They believe that there is some telluric, climatic, atmospheric, unknown condition, which influences its rise, spread, and subsequent subsidence; that cholera does not spread by human intercourse, and that even if it were demonstrated that it did so spread, nothing could be done to prevent such intercourse. They further maintain, and strengthen their position I think, by advancing the fact, and it is a fact borne out by my individual experience of over fifteen years, "that attendants on cholera cases, do not necessarily suffer from cholera, nor are they attacked in larger proportions, or with greater frequency than other classes of people, which they would certainly be, had cholera been propagated purely by human intercourse by human

contagion and infection." Further they say, that "isolation of the sick and disinfection of the discharges, are valueless."—(Cunningham.)

There are others who maintain certain pet theories, who ignore the experience of others, and force their own on the world. I class them under the head of alarmists. Chief among these, are those who attach undue importance to one or other particular cause, such as human intercourse. This is rather a comprehensive term. Dr. Duncan, a young Bengal Surgeon of the Indian Medical Service, who has recently been awarded the "Parkes Memorial Medal," for 1886, for his essay on the prevention of disease in tropical and sub-tropical campaigns, and who is a vigorous, I should say an uncompromising, advocate of the human intercourse theory, includes under these two words, the following incongruous mass of one thing and another:—"suffice it," he says*, "to enumerate the air, the drinking water, the cooking water, the solid food, the bedding, the tents, the bodies of the dead; and dominating all these, the dejecta of the sick or their effluvia." It is forgotten by this class of thinkers, that when cholera breaks out in an epidemic form in a town, several cases occur all at once, having no connection with each other of any kind. Where cholera is endemic, one case may occur or one hundred at a time, without personal contact. Some of these mono-theorists attach so much, and such undue, importance to drinking water alone, that they get completely lost in their solitary idea, and think of no other equally potent, or even under some circumstances a more potent, or perhaps the only mode of infection. Thus, for instance, Dr. MacNamara says:—"That if we only preserve the drinking water from contamination, it is out of the question, cholera should become epidemic in either town or country." In saying so, Dr. MacNamara furnishes me with an argument against cholera quarantine. A cholera case, according to him, may remain in the close vicinity of the drinking water reservoir without danger, *i.e.*, he would say:—"Guard the water against the inroads of the affected person, and you need not fear his presence." It has however been my experience, that other causes than contamination of water have brought on cholera, such as tainted food supply. Cholera has prevailed under my eye in Sibi, and in Thana, notwithstanding a pure and uncontaminated water supply. In June 1879, during the late Afghan Campaign, I was in medical charge of the outpost at Sibi, in Southern Afghanistan. Our water supply was running and abundant, coming down from the Nari gorge clear, sweet, and uncontaminated. There was no cholera in its ripal villages. The river runs north to south. Cholera, on the other hand, had been marching from south to north, in the line of our communication, from Sukkur, Jacobabad, through Kutchi Pat—a barren waterless tract in Balochistan, extending over ten miles. It touched the towns of Haji-ka-shaho and Bugh, killing several men along the southern course of the River Nari, to the north of which we had our outpost (infantry, cavalry, and native followers) flocked together. This epidemic of cholera subsequently reached Dadur, and only thence came to us, as we received our rations from the Dadur Depôt Commissariat. Not long after, it passed through the Bolan Pass, and thence it went on to Quella. Thence it travelled on through the Sind Horse Cavalry post at Khooshdilkhan, and through

* Op. cit., p. 312.

the Khojak Pass on to Kandahar, at the speed at which human intercourse can reach from place to place. Now, if we had held the sole theory of these drinking water alarmists, we should have felt ourselves insecure in our outpost only, on account of our water supply, or rather secure because our river was running north to south, and we might have misspent our energies. But I knew it was no good lending myself to one theory, and I was prepared for an outbreak, and as sure as anything it came our way before it had travelled through the Bolan Pass. This stands on the records of the Deputy Surgeon-General of the Sind Division, under whose orders I was then working.

We have now to take cognisance of the germ theorists. The germ theory is a mighty question, vast in its extent, difficult of verification, and weighty in its results. It is at present in its infancy; it would be presumptuous to discuss its merits here; it would be premature, and even perilous, to consign it to oblivion. We are living in the age of microbes. Koch, with all the advantages of modern microscopical appliances, claims that he has demonstrated that cholera is due to a specific bacillus which, under certain favourable circumstances, can live and multiply. Those favourable circumstances are principally the alkaline state of the human intestines. Koch further says that the acid secretions of the stomach destroy it, that it is present in every cholera stool, and that it is the cause of Cholera-Asiatica. Now, Gentlemen, the evidence which connects the particulate organism, or the comma bacillus, with the origin or causation of the disease itself, is highly unsatisfactory. It has yet to be proved what the contagium vivum of cholera is, and how it is carried about, whether as a spore, or as a bacillus pure and simple; for be it remembered, according to the latest classification of Professor De Bary, the cholera bacillus, whether it is a bacillus, or a vibrio, or a spirillum, or the representative of a genus midway between bacillus and spirillum, as Trouessart says it is believed to be, it is one of the endosporous bacteria, *i.e.*, having their spores formed endogenously, whether Koch has been, or will be able to find its spore or not.

Klein thinks the poison of cholera is of the nature of a ptomaine. Bellew, an officer of vast Indian experience, calls it an influenza of the mucous membrane of the intestinal canal.

Such is the state of our present knowledge—theories bearing out certain points, and conflicting on the other hand with certain other equally well noted experiences. Now let me proceed to examine how our present stock of knowledge helps us in the consideration of the question of quarantine. Dr. Duncan's work supplies me abundantly with facts which can be used against the present system of quarantine:—(1) Dr. Van Gazel, of Gangam, gives an instance of what occurred in his district. "In 1885," he says, "cholera raged all over the Gangam District, but Gopaulpore suffered immunity. The villages in the neighbourhood of Gopaulpore were all affected, communication from which daily occurred with Gopaulpore. But the latter village had, absolutely, no tanks whatever." Thus it follows, that if the tanks were stopped from being contaminated, were covered up, closed entirely for washing purposes, there would be no necessity for quarantine. (2) Dr. Duncan says:—"Reviewing all evidence, we see that evidence, involving practically all parts of India, coincides in one direction. The investigation of those in chief sanitary authority bear testimony, as conclusive as

testimony can be, that cholera-polluted water is the cause of cholera epidemics." Nevertheless, such evidence has been passed over as one-sided, and held to be of no value. (3) Dr. Johnson, of Hong Kong, declared at the Medico-Chirurgical Society, that the disease was frequently introduced there, yet it never became epidemic; and this he showed to be entirely due to the excellent water supplied and obtained from lofty reservoirs on Victoria Park, and used by the inhabitants. He was also in charge of a man-of-war, which entered Shanghai harbour at a time when cholera was raging round him. Some of the crew became infected. Immediately all on board were ordered to drink distilled water. The ship steamed away north, and the epidemic ceased. There were other ships also infected, which likewise went away north; but as they were using the water they had brought from shore, cholera continued, and only stopped with the stoppage of the tainted water, and use of the distilled water instead. If, as Dr. Duncan says, water is the only medium for conveying poison, as long as the water is protected, there is no scientific reason whatever why harbour quarantine should be enforced, supposing a ship came from an infected locality, had no sick men on board, but was kept out merely because it is the rule, and it may be that a case of cholera may occur. This leads us to the consideration of the question of incubation. How long can a man be actually with the cholera germ in his system, and yet apparently well. Dr. Pringle fixes it at two days. It is not very easy to determine this. It may be ten days, or even more. (4) The next argument against cholera quarantine is, that it is a noted fact that epidemics do not arise in a town from one imported case, especially if the town is healthy, and the cholera stools are carefully disposed of (burnt), and thus effectually destroyed. (5) Professor Frankland's experiments show that Koch's bacilli grow very quickly in sewage. Thus, where the cholera stools are not brought into contact with sewage, there is no necessity for preventing ship's men from landing if the ship comes from an infected locality, or even if they have a cholera case on board. Frankland's experiments would seem to conflict with Koch's, however, for we know that in sewage there are putrefying organic matters, and Koch has shown that the existence of putrefaction arrests the growth of cholera organisms. Here, then, is need for further research, as Professor Koch himself allows. (6) The next argument against cholera quarantine is the idea that "stools are the most important poison bearers, if not the only poison bearers." If, therefore, you destroy the stools, by burning them, you need not insist on quarantine. Koch and Pettenkofer urge that the cholera stools are poisonous directly after they are passed, whilst Thiersch would hold that a certain change is necessary before they attain their infective power. Corrosive sublimate is considered the best and most reliable destructive agent for germs—a five per cent. solution. I say burn them. (7) I may add that Professor Lebert, of Breslau, does not believe in quarantine at all.

In the face of Koch's theory, that the drying of cholera bacillus in mere open air kills the germ, the process of disinfection is rendered unnecessary, and cholera would seem to be shorn of all its pristine gravity. The dread of cholera must vanish; and the necessity of disinfecting, entailing such a large expenditure of money, time, and energy to municipalities and health boards to find disinfectants and

germicides, should, *a priori*, vanish, especially in such a hot country as India; but it has been my experience that, in a temperature of 115° in the shade, and 130° in the open, lasting for over six hours—when medicine bottles have gone to pieces, and measure glasses cracked from sheer heat—we could not kill cholera germs straight off (as would be imagined should have happened of a necessity if Koch is right), when cholera broke out in our outpost in the hot plains of Sibi, in the year 1879. If Professor Koch is right, well may Cunningham, Hunter and Fayrer, who represent the sceptical school, exclaim, "Our task is done! Mere act of drying is enough disinfection! We don't insist on more!" Dr. Cunningham says the same thing. He says there is abundant evidence to show that isolation of the sick, and disinfection of the discharges, are valueless. Koch however recommends, as an additional measure, boiling of clothes and bedding for an hour, and soaking in a solution of corrosive sublimate (four ounces to a gallon) for two hours; or immersion for twenty-four hours in a weak solution of carbolic acid (two per cent.) and chloride of lime (one per cent).

As long as the true period of incubation is not settled, quarantine by sea cannot be fully established. In a report on the diffusion of cholera and its prevalence in Europe during the ten years 1865-74, submitted to the Medical Officer of the Privy Council by Mr. Netten Radcliffe,* we read as follows:—"The experience of this country since 1865 has tended to show that cholera may be carried greater distances in a latent or undetected form than had previously been suspected. The instances I have already quoted, of bodies of emigrants travelling from infected districts of the Continent across the German Ocean, and across England, several days' sail out into the Atlantic Ocean before any sign of cholera was manifested among them, are peculiarly instructive with regard to the question now under consideration." What then is the use, I ask, from a scientific point of view, of subjecting a ship from an infected port, from India for instance, to mere eight or ten days' meaningless quarantine? There is no rational answer.

The common mistake that is made in connection with the question of quarantine by sea and by land is, that the term "human intercourse" is understood to mean "propagation." The terms are made co-extensive. The one may *lead*, I admit, to the other; but is not, nor need be, the sequence of the other. There may be ever so much human intercourse; but if, as the necessary condition of that intercourse, there is every care taken to destroy or disinfect the discharges from a cholera patient, then I submit, all the necessary precautionary measures so far as we understand them, and so far as we can control them, will have been adopted, and every possible danger averted.

The Vienna conference of 1874 unanimously accepted the conclusion of the Constantinople conference of 1866, that "Cholera is transmissible by goods employed for personal use coming from an infected place, and especially by such as have been used by cholera patients; and that there are even facts which show that the disease may be conveyed to a distance by such goods if they have been kept close and unexposed to free circulation of air." This is what the Vienna conference admits. If it be so, then it stands to reason that there would be transmission of

* Reports of the Medical Officer of Privy Council. New Series, No. 5, p. 146.

cholera possible by merchandise arriving from an infected locality. The possibility of such an occurrence is even probable. Take, for instance, the case of the Indian wheat and rice, and other articles of food that annually leave the shores of India for the European markets. India is no longer the curiosity shop it was in the olden days of the East India Company. It is no longer the repository of the barbaric pearl and gold. That envied position is now transferred to your colonies. India is now the granary of England, and is daily increasing in importance.

To give you an idea in quantity, take the wheat sent out from India in 1873. It was one and three-quarter million cwt.; it is now sent out to the extent of twenty-one million cwt. Up to 1875, the export of oil seeds have averaged about four million cwt.; "but," says Sir William Hunter, "they were freed from duty, and by 1885 the quantity exported had grown to eighteen million cwt." The rice trade has not shown such considerable increase, but still we send it out to Europe in large quantities enough to infect all England, or even Europe, if tainted with cholera poison. Now when we come to think of the habits of the people who gather the corn and the oil seeds from fields and forests of India, and when we know they are by no means scrupulously clean, or mindful of sanitary laws, if at all they are made aware of them, I cannot help thinking and even feeling a sort of apprehension, that the more our Indian grain bags are exposed for sale in European markets, the greater is the chance of cholera contagion being introduced from the east to the west—from India into Europe. When ships carry such bags from tainted localities, is it not reasonable to expect that they should be subjected to quarantine rules? But how are the authorities to know where the bags come from—from tainted cholera districts, or otherwise themselves tainted, or not? All this it is impossible to know; the exporting merchants won't know it, and won't tell if they know it; the inland field purchaser, or broker, would hardly be aware of the danger of buying the grain in a cholera-stricken locality; and what is the result? Practically, the grain coming from a cholera-stricken country, is exempt from sanitary rules and quarantine cordons; and the human being—clean washed men and women, coming from cholera-stricken localities—perhaps equally tainted, or maybe, quite untainted, have to go through the rigid observance of quarantine rules! Is it not all a farce? I ask, therefore, are not our present quarantine measures highly unscientific?

What Sir Ranald Martin said years ago, applies with still greater force to the circumstances of our own day:—"Quarantine can no longer be adopted," he says, "as the means of preventing the entrance of cholera into England, for it is incompatible with the present state of commercial intercourse, and with the well-being of a commercial country." Far better, I say, therefore, would it be to direct our whole and sole energy to the isolation of those who are actually sick, and to the destruction of their excreta, than to waste our time, energy, and money in carrying out what is a mere mockery of quarantine—a shadow, instead of the substance. Koch has said that cholera has never reached Europe from India by merchandise; "we have," he says, "letters and parcels sent by post; they have never carried cholera." This affords an additional argument against the present quarantine arrangement. Yet it can never

be said that cholera may not be so transferred. I have handled hundreds of daily cholera reports sent to me by village officers and town officers from infected places, where cholera has often fiercely raged, but neither have I, nor my assistants, ever suffered from the disease, and hope never may. Pettenkofer very rightly observes, that a germ of cholera may remain latent even a whole year, he does not know exactly how long.

Mr. John Simon, the great sanitary patriarch of England, has said, and said truly, "that Her Majesty's Government has been now for years past promoting the study of cholera in India, with the best lights of contemporary European knowledge, and no one will doubt but that here, as in other departments of medical research, truly scientific study must eventuate in practical good." "If," says this veteran hygienist, "the constantly developing and constantly accelerating commerce between India and the rest of the world is not to carry with it a constantly increasing terror of pestilence, the safeguards, I apprehend, will consist, not in contrivances of quarantine to maintain from time to time more or less seclusion of nation from nation, but rather in such progressive sanitary improvements on both sides as will reduce to a minimum on the one side the conditions which originate the infection, and on the other side the conditions which extend it." Quarantine separates, I most emphatically say, man from man in the most unwarrantable manner, in the most cruel manner, and in an utterly useless manner; commerce on the other, unites us, and strengthens the bonds of mutual sympathy. Let us therefore, not only as men of science and culture, but as the contributors to the commerce and the "human intercourse" of the world, never forget the golden words of one of England's greatest poets, that:—

"The bond of commerce was designed
To associate all the branches of mankind,
And if a boundless plenty be the robe,
Trade is the golden girdle of the globe;
Wise to promote whatever end He means,
God opens fruitful nature's various scenes;
Each climate needs what other climes produce,
And offers something for the general use."

THE NECESSITY OF FEDERAL INSPECTION OF FOREIGN-GOING SHIPS ARRIVING AT AUSTRALIAN PORTS, COUPLED WITH ISOLATING AND FEDERAL QUARANTINE LAWS.

By A. E. Salter, M.B., Thursday Island.

It must be understood that I use the term "federal" to indicate that these acts should be done under intercolonial treaty, not that we must have intercolonial federation first. Of all those things which affect the welfare of mankind as a mass, and under the influence of which all varieties of human beings come, irrespective of language, race, religion, or climatic and geographical peculiarities, none is applied so absolutely to all, and none is so important, as the liability to disease and death;

and means for the prevention of the first, and averting the second, are questions of the most vital importance to all the inhabitants of the globe. The great political questions of the day are subjects which have for their ultimate object selfish ends in view; and nations, when studying any of these questions, ask themselves, which is best for them to advocate from their own point of view—which will benefit them the most, and their neighbour the least?

But in circumscribing and isolating preventible diseases, the benefit of all the individuals of the different races of mankind is held in view; and if such a thing as unity of action among all states, having for its object the suppression of certain infectious and contagious diseases throughout the world were ever brought about, those diseases would soon cease to be known, except as matters of medical history. This end attained, would produce both a great improvement in the human race as a race, and mitigate the sorrow and pain of the individuals of that race. But such a thing as unity of thought among all the earth's nations on this subject, or, perhaps I should say, better unity of interest, seems still a long way off. It would be beneficial, however, if unity of system, having for its object the isolation of infectious diseases, could be attained among states which are conterminous, and one step would have thus been made in the direction of the unity of nations for the same purpose. The minds of men are in a state of perpetual excitement concerning things which they believe must benefit themselves, their friends, or their nation; but there is perhaps nothing about which all their opinions would be agreed so much as that it is good to prevent disease. It is with the hope of helping towards this object in Australia that I bring under notice the necessity for a unity of system among the Australian colonies, by virtue of which virulent, infectious, and contagious diseases may be no longer carried from port to port as has been hitherto the case, but may be removed and treated as early as possible. I shall not indicate any particular places which are more suitable than others for the purposes of isolation, though I shall refer to a few characteristics of these Straits, which well qualify it for such a filtering station. Possibly other places exist which may suit better.

We require similarity of quarantine law, in order that greater safety may be given to the inhabitants of Australia, to the healthy passengers in ships, and to those who may be sick on board ship; and so that anomalies, such as have happened under existing multiple systems, may cease to be known. For a very considerable time a system, having as its object the interception and isolation of infectious diseases brought to this country by sea—such system to be maintained by the united Australian colonies—has attracted the attention of the statesmen and sanitary authorities of Australia.

Some have objected to our present quarantine, on the ground that it has been tried in Europe and America and found almost useless, and in the case of Great Britain, abandoned; but, even these will, I think agree, that the inspection of vessels arriving at the first port of call on the Australian coast, and the removal of any cases of infectious diseases, is a necessity.

As to the question of quarantine in Europe, it has been a much debated one, and the sanitary authorities of England have come to the conclusion that sufficient benefit did not result from it to compensate for

the injury to trade caused by it. Accordingly, England has only a system of inspection, and removal of contagious and infectious cases at the port of call.

Now, the comparison between Great Britain and Australia is not a good one, because, as has been pointed out, Great Britain has a most excellent internal sanitation, and Australia has just as bad a one. This is a difference between the two countries which time ought to overcome; but there are differences which appear to me of more importance, since they cannot be got rid of—they are geographical and meteorological. The Australian colonies are isolated from other countries much more completely than Great Britain is. The continent of Australia has an immense coast line, at various points of which vessels arrive, and thence travel along her shores for days, and thousands of miles. In Great Britain such journeys are impossible, and did they take place even under the English system of inspection, it is certain that vessels would not arrive at ports having cases of small-pox, scarlet fever, or cholera on board, and be compelled to go out of them with their cases still on board. Yet this is precisely what happens in Australia. England's internal sanitary arrangements are unsurpassed; but even they are being continually improved, and the authorities expect to get great benefits from the Local Government Act just passed, while everywhere isolating hospitals for special diseases of an infectious nature are being built. As to Australia's internal sanitary arrangements, it is correct to say that no scheme carried out under Intercolonial Treaty exists; from which it follows that, while one colony may be expending large sums on its own internal sanitation, its neighbour may be doing nothing at all. It is to be hoped that a commencement in the direction of unity in this very important matter may be made by the establishment of federal medical inspection, and isolating stations.

As to meteorological differences between England and Australia, the temperature of the former is very much lower than that of the latter. The winter of Great Britain is almost sufficient itself to inhibit the vitality of the infecting particles where they become exposed to its influence outside the houses. And last, and most important of all, Australia has no united plan for the isolation of those cases of disease arriving by sea which, as I have pointed out, England has, and which I am now advocating for Australia.

Having in view these great differences between the two countries, I take it that the result obtained by a comparison between them is not sufficiently valuable to be entertained. At any rate, it seems to me that for those who will persist in arguing from this comparison, the only conclusion is, that if it is a bad thing to have quarantine because England has not got it, that is, if it is a bad thing to differ in this law from her, it is a good thing to resemble her; and therefore, those persons will be in favour of isolating stations which—as Australia is not like Great Britain, one empire, but several colonies—must be maintained under Intercolonial Treaty; that is, a federal inspection and isolating system, and federal quarantine laws, under which the infecting cases would be removed before the vessels carrying them reached the centres of population. During the last eighteen months, it has quite frequently happened that vessels have passed through Torres Straits, having one or more cases of small pox on board, and thus freighted have proceeded past

Cape York, southwards along the eastern coast for nearly two thousand miles, reaching Sydney at last, where the infectious cases have been removed, if they have not already died before reaching that port. That is, we have a vessel passing within a mile of a port where, if the patients could have been landed, they could have received that attention which can be given with so much greater advantage ashore, while the passengers remaining in the ship proceeding on its voyage, after being cleansed and disinfected, would have travelled more safely, and the shipowners would, in the event of no more illness breaking out, have been saved the expense of a number of days in quarantine ; and superadded to these advantages, such highly infectious and contagious diseases as were on board would have been kept away from the centres of population, and possibly, such a contingency as the infecting of families outside the quarantine station at Sydney have been avoided, the disease being left at the least thickly populated part of Australia, instead of the most thickly populated.

Under federal quarantine or federal inspection, another advantage and a very material one would be gained, in addition to the sweeping away of the present inhuman and barbaric state of things ; the advantage to which I refer, is the co-operation of the charterers of steamships, in the detection of suspicious cases. These latter deserve the greatest credit as a class, for the way in which they have always assisted the Health Department in the detection of cases of disease. Still, it is not part of their business to co-operate with that department, much less is it to their advantage under the present Laws; but under the new régime, which I trust some day to find adopted, and which I wish to indicate in this paper, they would have every inducement to assist in the detection and expulsion of such cases. It would be so clearly to their advantage, and to the conducement of their comfort, that they would only too willingly seek to discover any disease. Where now a master of a ship, if he were unscrupulous enough, might misstate the number of his passengers and crew, on account of his intention to conceal one of them, who appeared sickening ; under the more favourable circumstances, he would be only too glad to indicate the case and get rid of it, seeing as he must, how advantageous it would be for his owners and passengers, not to have a source of infection, which hourly was threatening to spread itself in spite of all his precautions.

Again, the necessity for isolating stations at convenient ports, is as great as the necessity for infectious disease hospitals ashore, such as are now found to work so well in Great Britain. This is a greater necessity ; for it is possible, that sick persons ashore may get the best attention, but a person on board ship, affected with a deadly contagious or infectious disease, must expect to be looked upon with dread by all on board ; and we must all know that the facilities, even on the best appointed steamship, can be but indifferent, compared with those which he may reasonably expect ashore. Humanity alone urges the establishment, without further delay, of such isolating stations, which may be called the disease filters of Australia.

Many people are, perhaps, unaware of the course usually pursued when a person on board ship is found to be suffering from a disease which the master has reason to believe may prove to be an infectious one. To such, it may be news to learn that the sick are placed in one of

the ship's boats, over which a tarpaulin is erected to protect the invalid from the sun, wind, and rain. This portion of the ship's furniture being the most isolated and easiest disinfected, and the least expensive to destroy, is the place chosen for the future home of the pest stricken patient, until he is put ashore. I do not think it is necessary to enlarge upon the condition of the poor mortal condemned to pass eight to ten days of his existence under such circumstances, at a time too when he wants all the help he can get from his fellow-beings, and all the skill likewise. As the greater number of vessels passing this port do not carry medical men, the unfortunate sick have not much to depend upon in this respect. No doubt the boat is the best place at the captain's disposal; he does his best for the man who is infected, and also for those not infected, by placing him there, but for the person to remain under such circumstances after he has passed close to a port, should be quite beyond a civilized nation's ideas of humanity. The facts of the case, I feel sure, only require to be generally known to the Australian people for them to terminate so bad a condition of things.

One more proof of the necessity, by analogy. It is admitted that it is good that ships should be inspected, and their diseased passengers isolated, at Port Phillip Heads, at Sydney Heads, at Moreton Bay, and not at Melbourne city, nor Sydney city, nor Brisbane city. Is it not then still better that the ship should be inspected and its cases isolated at some port further removed in the line of call, such as Torres Straits.

I now come to those particulars in connection with Torres Straits, which specially fit it to be an inspecting and isolating station. It is to the East Australian Coast, what Port Phillip Heads and Sydney Heads are to their respective cities, for very few vessels indeed do, and still fewer will, in future, pass outside these straits when coming to East Australian ports. Whenever they do so come outside, they must pass to the north of New Guinea. The course over ninety per cent. at least adopt is to come along from Java to Torres Straits, and through the channel between Goode Island and North West Reef—through the passage known as Prince of Wales Channel—on to the passage between Albany Island and the mainland, and south to Cooktown, Sydney, Melbourne, and Adelaide.

One other point has Torres Straits in common with the Heads before referred to, it is the pilot station for the channel through which the vessels pass down the coast; it is there the pilots are taken on board, although the port may not be entered—a matter which is only of importance in so much as it goes to prove that no more hardship would be entailed upon a vessel in compelling it to be examined at Torres Straits, than is entailed by compelling it to be examined at Sydney Heads, and the result, as I have tried to explain, would be much more to its owner's advantage. At present, it is as if it were decided better that ships should be examined at Port Melbourne and the Circular Quay, instead of before reaching those populated localities. If, however, it is better to isolate your infectious diseases at the boundaries of the chief ports that is at their entrances, it is better still to isolate at those entrances still more remote to the continent itself.

It has been argued by some, that it is no use establishing such stations and having such inspections, because the disease may not be developed at the time of the ship's arrival at the inspecting port. Now,

that the disease may be undeveloped, is perfectly true, but it is not in itself any reason why the stations should not be formed, for if it were, it would be a reason why stations should not exist at Port Phillip Heads or Sydney Heads, or the entrance to any other port. Those stations are there to detect and stop disease, if it be found present, and they can do no more; if they do it once in twelve months, they prove their usefulness. As a matter of experience, too, these diseases have generally happened before arrival, even at Port Darwin, and during the last epidemic of small-pox in China, ship after ship passed this port with cases of small-pox on board. In my opinion, these intercolonial isolating stations should be a commencement, in part, of a system of sanitation of the whole of Australia. And, at all events, from every point of view, a place should have been in readiness for the cases which have occurred in the past, and most assuredly will occur again in the future.

It is, after all, an outer line of defence. It may be carried, but it should be there; and as a nation should be prepared to defend itself against warlike neighbours, so should it be prepared to intercept infectious disease at its different gates. As the entrance to its harbour should be guarded by torpedo mines, so should that entrance be made to act as a filter to waylay infectious diseases, and prevent their further march.

Is it necessary to say more? The matter seems to me to be one of those facts which commend themselves to the common sense of all, and only requires to be known in order to be accepted.

As to the need of a uniform quarantine law, I think the citation of a few examples of what actually has taken place under our existing multiple system of quarantine law is sufficient to prove the urgent need of a change.

During the small-pox outbreak in Tasmania some of the colonies enforced quarantine against Tasmania, others only treated the vessels to inspection, and others did not do that. There was no good reason why they should not have followed one uniform system; and it made the law appear ridiculous when they did not. Suppose, for instance, that Victoria rendered twenty-one days quarantine imperative against ships from Tasmania, but New South Wales deemed inspection alone sufficient, what would result? Why, Victorian passengers would proceed per steamer from Tasmania to New South Wales, and thence per steamer or railway to Victoria, the time taken up only being a few days longer than by the old direct way of travelling, and the risk of persons coming into Victoria liable to the disease being just as great. With the law uniform, this could not occur. What one colony enforced, the other would enforce.

One more example of anomaly, resulting from difference in quarantine law. Early in this year the law of Queensland said, "No person shall land at a Queensland port who has had communication with a Java port, unless he do fourteen days quarantine." The quarantine law of New South Wales said, "Java is a clean country, we do not intend to quarantine any person arriving therefrom." What then happens? Passengers in Batavia wishing to come to Queensland, take ship for Sydney, and arriving there take the railway to Brisbane, having been delayed by a day or two, no more, so far as travelling time is concerned, but having been put to much extra expense, and perhaps, kept in Java a week or more waiting for a steamer.

It is no wonder that people, under those circumstances, laugh at the eccentricities of the law, and at the same time complain of the expense it puts them to, without achieving the result intended. I might cite other examples similar to these, but it cannot be necessary. Were there unity of quarantine law, these things would be known no more, and much just, but very unfavourable, criticism avoided.

In conclusion, it is my earnest desire to see unity of purpose among the Australian colonies, in producing unity of quarantine law, working in combination with a system of intercolonial inspecting and isolating stations, culminating in the production of a system to which other nations may point as an example of good law and of humanity.

THE EVILS OF SPECIALISM.

By Duncan Turner, L.R.C.P. Lond., L.R.C.S. Ed.

That specialism must exist in medicine and surgery at the present day, no one will deny. Kept within reasonable bounds, it has its uses; but if allowed to go on multiplying, and so to speak, run riot, it is fraught with numerous and dangerous evils. In my humble judgment it is a cankering sore, which will gradually drain and irretrievably injure the dignity, position, and usefulness of the profession at large. It is not the intention of this paper to point out how to keep specialism in its place. My attempt is simply to call the attention of the profession to its mischief, in the hope that some general professional opinion on the subject may be brought to bear to curb it, and restrict it within proper lines. That specialism has great attractions and temptations is true. Indeed, the bed of the specialist is generally so rosy that it is no wonder so many are led into the ranks. For the hard-worked practitioner to emerge from the toils and hardships of general practice to the ease and elegance of specialism, is like escaping from a wilderness of thistles into a Garden of Eden. Moreover, special practice is easy—it is money-making; and socially, the specialist stands as high, if not higher, with the general public as the all-round practitioner. But when the profession is divided and sub-divided into a multitude of sections, that our status must ultimately be lowered, is certain. Quackery will creep in, and it is doubtful whether any legislation we are likely to get in modern democratic days will in any degree check it. Already, we have numbers of people calling themselves eye and ear doctors, who have no education whatever. Why is this? Simply because the laity know there is "money in it," while the public outside are ready to run after a specialist, whether he is educated or not. Not least among the evils of specialism is, that it takes away a great many fees from the hard-worked general practitioner, and that too, in cases he could manage as well, or perhaps better, than the specialist.

I am not going to run down specialism *in globo*. Some of its forms no one objects to. Diseases of the eye have for many years been regarded as a proper sphere for specialism, and it must be acknowledged

that the best discoveries in the treatment of eye diseases have been made by special practitioners. The same may be said of diseases of other special organs. But none of the great discoveries in medicine or surgery can be claimed for specialists. The mischief is, that the mind of the specialist gets contracted, like that of other special workmen. After all, he is only a superior workman. I have heard of workmen in Birmingham who make nothing but hinges all their lives, and no doubt, they attach a vast importance to their calling, and occasionally wonder what the world would do without them. I have no means of knowing their mental calibre; but I make a shrewd guess that their thoughts are pretty well confined to the qualities of the iron they use, and the pay they are to get. Machinery has in many instances replaced such workmen, and as machinery has already been made to do elaborate work in the way of calculation, possibly some machine will be invented to do the work of some specialists, just as well, if not better.

The human body cannot be split up for medical treatment into fifty or sixty different pieces, and any practitioner who gives exclusive attention to one organ, to the neglect of the others, is sure to blunder, and is, as a rule, unsafe. No doubt there is something to be said in respect of some of the external parts of the body. It has been already admitted that there is no objection to a moderate amount of specialism on such organs of sense as the eye and ear. But when specialism seizes on the internal organs, and one man takes the heart, another the liver, a third the kidneys, and so on, what are we to expect? At present we have no representative specialists for all these organs, but we have them for most, and there are signs that others are coming.

Is it not time for us to raise our voices against such abuses, which are calculated to undermine, and ultimately seriously injure, what a distinguished Victorian statesman called the noblest of all the professions. The world has recently beheld a spectacle which, I am afraid, will for a long time be remembered with shame—a set of specialists wrangling over the afflicted body of a distinguished Imperial patient. Who will deny that the whole thing will undoubtedly lower the entire profession in the eyes of the world?

Among the drawbacks of specialism is hair-splitting, that is, the invention of fanciful diseases and the consequent multiplication of indefinite medical terms, much to the confusion of the young student, and also of the ordinary practitioner.

I remember in my student days poring over a large volume well known to you—I mean Erasmus Wilson on skin diseases—and I have a keen recollection that, after several days of fighting with it, I put it down in disgust, coming to the philosophical conclusion—one worthy of Lord Dundreary—that skin diseases were among the things that "no fellah could understand." Now that our knowledge in this direction is extended, and I have had other means of studying these common ailments, I have no doubt whatever that Wilson split up eczema into at least four diseases that have no justification for a separate existence. Did time permit, I could mention many other diseases dealt with by specialists in the same way. Each specialist is discontented with the name adopted by a brother specialist, and must invent one of his own.

Now, I ask you, can anything be more tantalizing to the student or to the practitioner (for we are students all our lives), than this wading

through a needless multiplicity of names? Especially is it confusing and harassing to the hard-worked general practitioner, who is supposed to be equally well up in all the diseases that flesh is heir to. In France, the Academy of Medicine put some check on this process; but in Great Britain nothing of the sort has ever been attempted, if we except the effort made in that direction by the London College of Physicians. But I feel sure the day will come, when there will be a representative intercolonial medical congress to agree upon certain names for certain diseases, and so avoid this terrible and endless confusion.

In Melbourne, gynæcology is the only specialism that has attained that prominence, when it is viewed with some disfavour by the profession at large. I regret to say that I think there is some reason for this. I am not going to utter a word against the gynæcological practitioners of this city. Many of them are known to be honourable men, and zealous in their calling. But, as I hinted in a former part of this paper, it is one of the characteristics of the human mind, when it dwells on one subject for a length of time, that the understanding gets warped, and it sees things through a coloured atmosphere, which is always more or less harmful to the judgment. The specialism of gynæcology is eminently a money-making one; no wonder, therefore, that it is such a favourite with the medical profession. At the same time, it is certainly one in regard to which there is great danger of abuse of the trust the public put in us, so that its professors should be specially on their guard not to lay themselves open to the adverse criticism of their professional brethren. Our specialists must take warning that, however great favourites they may be with the public for the time being, or however large their yearly income, they cannot for any length of time brave the opinions of their medical brethren; and there are several instances in recent medical history, where a continuance in such courses brought ruin on those that persisted in them.

But it is when we come to gynæcology that we find this delightful multiplication of terms run riot. For example, for that common disease chronic metritis, I find in different text-books at least eight names; and some of the other diseases of the female generative organs fare as badly. We all know how much faith a woman puts in her medical adviser. We likewise know how many of the ailments supposed to be connected with the generative organs of women are purely imaginary, or at most, quite harmless. How easy it is then for an unscrupulous practitioner to fill his pockets full of gold from his nervous female patients? Turning to our own sex, we know what rich harvests quacks make from the unsuspecting, who are under a delusion about some purely imaginary disease of sexual functions. If ours, which is generally called the stronger sex, is liable to delusion in this way, need we wonder at what occasionally happens to the weaker one? An immortal poet, and a keen observer of human nature, has said—

> "Then gently scan your brother man,
> Still gentler, sister woman."

The changing fashions that prevail in the treatment of female diseases are, I think, only equalled in their dresses. I am old enough to remember when metrotomy was the panacea for all female ailments. Being over a quarter of a century in the profession, I have a vivid recollection of how these fashions burst upon us with a flourish of

trumpets, only to die away after a year or two, if not to be entirely forgotten, at least to take a back seat. Some thirty years ago, metrotomy was accepted as a panacea for almost all that female flesh is heir to. Then came Dr. Henry Bennet, with his inflammations, ulcerations, and caustics. A few years afterwards, the late Dr. Tyler Smith brought uterine cervical catarrh so prominently before the profession that he had a great many followers; and for some years, among London practitioners at least, no woman could have an ache in her head or foot but it was ascribed to this cause. Then came Dr. Graily Hewit, with his versions and flexions, and how many pessaries were invented by different specialists for their alleviation or cure, I would be afraid to say.

But it has been reserved for an American gynæcologist to make the discovery in female operative surgery which is so much in vogue at the present day, and judging from the frequency of its performance, has, in this respect, eclipsed all others. I need hardly say that I refer to the well-known operation of Emmet.

In this city especially, this distinguished specialist has found many zealous disciples; but, I think, were he present at this Congress, he would be ready to adopt for his motto—"Save me from my friends!" That his operation has been abused, I believe it is the opinion of nine-tenths of the profession in this country; and, what was at first a useful and scientific proceeding, and eminently necessary in many cases, is now got to be received with so much disfavour and suspicion, that the very name stinks in our nostrils, and few men who value their reputation would care to perform it. I hope the day will come when this operation will be relegated to its proper and legitimate place, and no longer practised in the wholesale manner we have been accustomed to witness for some years past.

HYGIENIC CONDITIONS OF ÅBO, FINLAND.

By Axel R. Spoof, M.D.

The town of Åbo, the number of whose inhabitants at the commencement of 1888 amounted to 27,592, does not yet enjoy a water supply, though one has been in preparation for five or six years. Nor has the town a public sewer canal system, though to this end a project was wrought out some years ago, and a report was made to the representative of the town. The said project proposed that the cleaning take place by means of sewers and surface irrigation; but this system, in view of our long winters—about six months—during which vegetation is quite dead, was considered to be inapplicable, and hence the project has not been accomplished. In lieu thereof, the authorities have agreed that, in the most populated parts of the town, the fluid excreta be conducted into the river, which runs through the town, and falls into the sea within the port district. The solid excreta is collected in pails impervious to water, and is brought outside the town by means of light carriages, for the most part by neighbouring farmers, who make use of it as soon as possible.

The morbility and mortality in some of the most important epidemic and chronic diseases are shown in the table following, which I have

compiled according to official reports by the Local Board of Health, whose work began in 1880.

In order to as far as possible prevent the propagation of infection, each case of epidemic disease is immediately reported to the town doctor —at present K. K. Kynberg—with indications of the dwelling of the sick. Besides this, the Local Board of Health once a week collects a report from each of the practising medical men, about the number of cases treated by him in the previous week. Blank forms are supplied by the board for the purpose.

For statistical purposes, such means are further taken, that every death is to be attested by the doctor who has treated the case, or by the town doctor.

The Morbility at Åbo 1880–87.

Disease.	1880	1881	1882	1883	1884	1885	1886	1887
Typhus abdomin. ..	477	31	189	37	56	21	19	23
Febris remittens	774	39	254	131	77	57	95	90
Febris intermittens		578	517	809	724	518	881	822
Mening. cerebro-spin. epidem. ..	..	..	..	..	..	..	4	..
Dys-enteria ..	16	11	11	2	2	..	12	26
Variola & variolois ..	5	95	17	2	..	..	..	..
Scarlatina	26	5	231	117	98	116	106	15
Morbilli	555	46	13	1	4	811	72	3
Rubeola	..	..	..	..	..	5	158	14
Erysipelas idiop. ..	37	48	44	27	13	19	74	86
Febris puerperalis ..	6	13	6	1	3	5	4	3
Diphtheria faucium	82	54	44	62	9	8	36	24
Laryngitis crouposa	14	13	14	9			15	36
Pertussis	18	98	40	7	239	41	13	4
Pneumonia, croup et pleuritis ..	353	303	205	237	209	196	185	147
Rheumatismus ..	149	169	179	121	150	153	94	95

The Mortality at Åbo, 1880–87.

Disease.	1880	1881	1882	1883	1884	1885	1886	1887
Typhus abdomin. ..	(?)	18	37	12	11	5	9	5
Dys-enteria ..	(?)	2	..	..	..	..	2	..
Variola	(?)	39	6	3	..	..	..	..
Scarlatina	..	..	62	19	8	18	19	2
Morbilli	..	8	3	..	..	58	..	..
Erysipelas idiop. ..	..	..	2	2	..	2	3	7
Febris puerperalis ..	..	3	3	1	1	3	2	..
Diphtheria faucium	..	3	3	7	..	..	5	8
Laryngitis crouposa	..	1	4	2	2	2	9	23
Pertussis	..	9	3	3	6	5	..	..
Pneumonia, croup et pleuritis ..	(?)	56	26	34	31	37	70	42
Phthisis pulmonum	(?)	130	89	70	86	81	113	125
Diseases of the brain and nerves ..	(?)	64	55	27	55	54	81	80
The number of the inhabitants was	22,529	..	24,916	25,480	25,052	25,796	26,365	27,186

Amongst the means which aim at the prevention of disease, or at least, at the mitigation of its influence, especially with regard to the working class, may be mentioned :—

(*a*) The town supports an infirmary for epidemic diseases, which at present, ought to be organised anew; and in connection with it an oven for disinfection, and a lodging for people whose dwelling and clothes, &c., are to be disinfected; and besides this, a town doctor, two district doctors, two midwives, and four district nurses are paid by the town.

The oven for disinfection on Merke's system (Germany), is kept at the free disposal of all, for disinfection in cases of epidemic diseases, as well as for cleaning from vermin objects belonging to any one of the town establishments. The oven is also at the disposal of others, on payment of eight shillings per oven, and four pence per bag. The things are brought to the oven in special carriages, and are received at one end of the building, and, if small, collected in bags and placed in the oven, which is then closed. Into it is let a continual stream of steam, of four atmospheres pressure, mixed with hot air. The temperature within the bags rises to somewhat above 100° C. Disinfection having gone on for an hour, the oven is allowed to get cool; the objects are taken out at the opposite end of the oven, and are brought to their owners in hired carriages.

Families dwelling in small rooms, and in whom some epidemic disease has broken out, are taken into the disinfecting lodging house, where they will be undressed and bathed, and afterwards dressed in the clothes of the establishment; whilst their own clothing and utensils are disinfected in the oven, and their dwelling is disinfected by the sanitary police for half-an-hour, by means of sulphur spray (1–1000) mixed with tartaric acid (5–1000), and again made safe by soda spray (1–100).

In order to provide, in case of necessity, the citizens, especially those without means, with nursing attendance, there are four district nurses. For the attendance which the nurse has rendered to a patient, she may neither demand nor receive remuneration of any kind whatever. From wealthy patients the Board of Health collects a moderate tax, which goes to an assistance fund for nurses that have grown old or infirm in the service. The instruction of the nurses is arranged agreeably to the principles laid down in Miss Florence Nightingale's "Notes on Nursing."

(*b*) Private associations, limited companies, or employers, have procured sound dwellings in different parts of the town, which afford to the industrious and regular workman a chance, at a moderate rent, to get light, clean, and comfortable houses; of which he may, if he likes, become the owner, by paying during the course of eighteen years, annually, a somewhat higher rent. Such dwellings are built on the Mühlhouse system, and at the end of 1887 there were four terraces, consisting in all of nineteen wooden houses, each containing three apartments and a kitchen, with a bake-oven. Of such a workman's domicile I send you a ground plan, with intersection and situation, together with a copy of the statutes for the Abo Workman Domicile Company, Limited.

In order to counteract the great mortality amongst tender children, which arises from unhealthy dwellings and careless treatment, there was organised two years ago, an Abo Child Protecting Association, after the

Berlin manner, with the object of taking care of tender children up to the age of three years. These are left in charge of nurses, carefully selected and controlled. The parents also, must contribute monthly sums, larger or smaller, towards the payment of the nurses, but always through the Association. A copy of the statutes is also forwarded.

Associations for mutual assistance in case of sickness or death are organised at the following larger industrial establishments, viz.:—Wm. Crichton and Company's Shipbuilding and Steam Engine Works, The Abo Iron Manufacturing Company, The Aura Sugar Refining Company, and the P. C. Rettig and Company Tobacco Works. The balance of those four associations amounted last December 1887, to 45,931 marks 25 pennies Finnish money, about £1700 English. Besides this, there exists a common Abo Workmen's Sick and Burial Fund, founded in the year 1879, whose members at present number 529, and the surplus 26,000 Finnish marks, somewhat above £1000. By paying to this fund an entrance fee and a monthly contribution, a workman will guarantee himself or his family fixed subsidies, in case of disease or death.

Statistics.

	Members.	Sick Subsidies Paid (Marks & Pennies.)	Funeral Subsidies for Members.
1880	114	650·25	4
1881	17	977·25	2
1882	36	986·25	1
1883	50	1081·25	1
1884	133	1956·	1
1885	62	2505·50	1
1886	89	3952·50	8
1887	173	4990·50	12

With regard to the hygiene of childhood, there ought yet to be mentioned:—(1) The Poor Child's Working House, and (2) the Public Schools of the town, which must not be confounded with the Public Lyceums and Female Schools of the State.

The Poor Child's Working House aims at procuring work and frugal meals for poor children, who would otherwise stroll and beg round the town. These are for children from four to fifteen years of age, who, so far as is known, have never been punished for crimes. The manager has to procure employment for children over twelve years. The children are taught an easy handiwork. A child who has entered the working house has no right to leave it the same day, before the house is closed for the evening. If a child does frequent a school where instruction is given in the forenoon, it receives in the working house dinner and supper; and, if the school is working in the afternoon, breakfast and dinner. This working house is supported by voluntary contributions from the citizens, the Savings Bank, and from private persons.

The Public or Common Schools of the Town.—According to the law of 1866, concerning the common primary schools, every town community is obliged to establish and support primary schools to such a number and extent, that all the children that do not, at home or in other schools, get the corresponding, or a more extensive knowledge, may be taught

gratis, from the eighth to the fourteenth year of age. From six to ten years of age, both sexes are taught together; but from the eleventh year upwards, each sex is to be held in separate apartments or schools. At the commencement of this year, *i.e.*, that of September 1888, the total number of children in those schools was about 2100.

The school establishments amount in all to fifteen, of which seven are provisionally in buildings originally constructed for other purposes, and eight in school-houses built and fitted up for the purpose. Of such a school-house, I forward a ground plan and a photograph. The ground plan shows the arrangement of ventilating channels, the system being an aspirating one, furnished with a separate funnel for sucking away the impure air. The air space is replenished on an average twice an hour. The temperature of the air, when streaming in—at 14° or 15° Celsius without, and a middling strong, cold wind from the north—varies between + 14° and + 35° Celsius.

The dimensions of the class-rooms, which are shown by the ground plan, vary but very little—the length from 7·97 to 8·75 metres, the breadth from 6·66 to 6·84 metres, and the height from 3·72 to 3·86 metres.

The subsellia of the said schools are two-seated, with movable seats. The dimensions of the subsellia are shown by the following table:—

Number of the Subsellium.	Distance from			The breadth of the table.	The breadth of the seat.	The length of the table for 2 children
	The breast border of the table to the seat.	The seat to the floor.	The breast border of the table to the floor.			
I.	20	34	54	41	25	105
II.	24	35	59	41	25	105
III.	26	39	65	42	26	111
IV.	27	42	69	46	29	115
V.	28	45	73	48	30	120
VI.	30	47	77	50	31	125

All these numbers are given in centimetres.

SOME REMARKS ON THE PRINCIPLES AND PRACTICE OF VENTILATION FOR COLD AND WARM CLIMATES.

By W. V. Jakins, L.R.C.P., L.M., &c.; Fell. Obst. Soc. Lond.

In the few minutes in which I purpose to occupy your attention, it is not my intention to describe the large number of systems for ventilation in general and occasional use, rather would I classify them, pointing out the advantages and disadvantages of each; preferring to dwell more in detail on those displayed in our International Exhibition.

Ventilation may be considered natural, when supplied by windows, skylights, and doors, which inevitably induce draughts, so that everywhere we find artificial ventilation applied to overcome these draughts, and to ensure an equable supply of fresh air. This is attempted in a simple manner, by outlets in the centreflowers of ceilings, in cornices,

just below cornices, and in chimney breasts—outlets sometimes simple, sometimes with valves. Simple outlets for heated or foul air commonly do not act at all; when they do act, I find them acting the reverse way, not as outlets, but as inlets for cold air, in windy weather inducing draughts. Outlets with valves generally act well, those in chimney breasts frequently emit smoke from the chimney; but in producing an outlet for heated air they suck in cold air, for the entry of which special provision has to be made, otherwise draughts come through window frames, key holes, and under doors. Inlets for fresh air are usually made through the ceilings, walls, cornices, skirtings, or floor. In calm air they are insufficient, in windy weather they cause draughts. Tobin's tubes, in which the current of fresh air can be readily regulated by a butterfly valve, is the most effectual means with which I am acquainted for supplying fresh air. Yet these are imperfect, for the air passes through them in a circling manner to the ceiling, there the circles break and the cold air falls down in a shower on our heads. In equable weather, this system acts fairly well. In still weather, like all other systems, it fails; and in like manner in windy weather, in spite of the valves, it causes draughts. Moreover, no provision is made in Tobin's system for letting out foul air.

With the imperfections I have described, mechanical means are generally resorted to for the supply of definite quantities of fresh air, in certain given directions, and at a certain velocity; these inlets are frequently furnished with revolving fans, which force the air through skirtings, walls, or ceilings. When properly adjusted, as to size of outlet, they are frequently of service, though far from perfect. The principle of revolving fans has been further developed by the use of air blasts, in which the fresh air passes through some cooling or heating process, and is then forced with some velocity into the room, by water motor, steam power, gas or petroleum engine, or electricity. Sometimes a water blast is used, which cools the air without any extraneous means. Several forms of blasts are in the Exhibition. I need hardly say that an air blast always induces draughts. Punkahs are another form for so-called cooling a room; of course, they do not affect a thermometer, although they may increase the evaporation from our skin, and thus produce coolness; the Iceberg and other electric fans act thus, like punkahs, by simply stirring up the air.

Mechanical forms of outlets generally take the form of exhausts; which may be a simple tube, a tube with a cap more or less modified a few inches beyond its extremity, or the cap may be replaced with endless varieties of cowls, to which is sometimes added an inner archimedian screw. The vacuum principle is sometimes employed; a jet of gas in a tube causing a rush of air alongside it out into the open air, as in an inlet water blast; a jet of steam is sometimes used in the place of gas; revolving fans are often of great use as outlets. To all these forms of outlets, the same objections may be offered as to the inlets—they are all more or less dependent on the wind velocity outside the house; and the adjustment as to outlet and inlet can never be so nicely regulated as not to cause draughts.

Now, with all these more or less pronounced failures in ventilation, let us consider a moment some of the principles involved in the circulation of air. In the first place, cold and warm air, of themselves,

will never mix together, nor will warm air go out through openings in a room to cold air ; also, cold air will not of itself go through openings in the walls or ceilings into a heated room, except as a wind ; therefore, ventilation, to be without draught, must be mechanical ; it must be possible easily to regulate it to a nicety, both as to outlet and inlet. We have to get rid of the heated air near the ceiling, which contains carbonic oxide and sulphurous acid, and we have to get rid also of the carbonic acid on the floor. Authorities agree in saying that the carbonic acid, when heated, rises to the ceiling—that is, a gas with a specific gravity of 1525, by being heated, rises above the level of heated air, which has a specific gravity of 1000—a gross absurdity; for although heat may expand a gas, causing it to fill a larger space, it cannot, to any degree, alter its weight.

I confess, that all my life I have been following authorities more or less, in my efforts to get rid of foul air, and it was not till last winter, in a lecture given at the Health Society's meeting, that I was able to grasp the true principles on which successful ventilation is based. This has led me to investigate this new scheme. I therefore purpose briefly to give you my results; for I am persuaded that, although there is much room for improvement in details, this colony has the honour to have produced the first and only correct system of ventilation, and one which is based on true scientific principles.

Now the first principle contended for is, that as carbonic acid is half as heavy again as common air, its outlets should be about the floor. Next, that as air improves in quality the nearer we go heavenwards, so the air should be drawn in from any height that may be necessary through inlets near, or in the ceiling ; also, that the indrawn, for it is not inforced, air, be introduced in a centrifugal fashion, not according to the capacity of the room, but according to the number of people it may have to contain ; this prevents the formation of heated air near the ceiling, and it also prevents the accumulation of carbonic acid in the corners of a room. These three principles are, I am satisfied, simply perfect.

Now for the evidence. On a hot afternoon I experimented in an office, dimensions 12 ft. x 10 ft. x 10 ft. high ; two sides of it were air proof—lining boards packed with charcoal ; the other two sides bluestone walls, having a window with fixed sashes ; the door was closed, four adults present ; ventilating fan six inches high by twenty-four inches across in the centre of the ceiling, going at the rate of 300 revolutions a minute, introducing 1000 cubic feet of fresh air a minute ; part of the skirting covered with perforated zinc, open about four inches by six inches. In spite of this large quantity of fresh air entering this very small room, the flame of a candle was not deflected in any part of it, not even a few inches underneath the revolving fan ; but along the walls, in places about six feet from the floor, it was difficult to keep the candle alight ; at the outlet in the skirting, the flame was strongly drawn towards the perforated zinc. While sitting on a chair pushed close to the wall, where the candle was nearly blown out, no draught was perceptible. From this and other matters, I am inclined to define a draught as a strong current of air proceeding more or less across a room ; and I would add, that a strong current of air, proceeding along the walls only, is not felt.

In corroboration of this experiment, a leading medical man now present had told me that fourteen men sat in that small room one very hot afternoon this summer (1888), without the slightest inconvenience.

Now for one more test. On New Year's afternoon I visited the morgue; three bodies on the slabs, two much decomposed; a hot oppressive north wind blowing. I suppose, for architectural or financial reasons, this system of ventilation was reversed, *i.e.*, the heavy gases were sucked up from the floor through two four-inch tubes for about twenty feet in height to the ceiling, where the fan, about two feet in diameter, was revolving at the rate of about 250 times a minute, throwing out about 800 cubic feet of foul air a minute, through the side lights (about three feet by one foot) on the north side. If the side lights on the south side had been open, instead of those on the north side, the strong north wind would have helped, instead of opposed, the eviction of the foul air. A still better plan would have been to cast out the bad air through the roof; nevertheless, with the doors closed, the offensiveness was slight. A candle flame was deflected nowhere throughout the spacious room (about 48 ft. x 24 ft. x 20 ft. high); it was immediately extinguished when placed near the exhaust pipes on the floor. Water slightly purple with Condy's fluid in a basin in the centre of the floor, did not change its colour.

These two experiments of mine form, I think, sufficient grounds for our thoroughly testing this system, for if the details be satisfactorily arranged, it must not only supersede all other systems, but what is of far more importance to us, we shall be able to keep our hospitals and public institutions cool and sweet, and thereby lessen their rates of mortality. Our governing bodies will also be enabled to lessen the size of these institutions, as so much cubic feet per inmate will not be required. Foul air on board ship, and heat apoplexy in the Red Sea passage, will become things of the past. Our mines, torpedo and submarine boats will be able to depend upon a good supply of pure air. Railway and tramcars and cabs need be no longer offensive; dairies and meat safes will probably some day be cooled on this principle. Hospitals for infectious diseases (small pox, yellow fever, scarlet fever, &c.), if the air from the outlets be passed through a small Bunsen's gas or other furnace, this foul air will become immediately purified, and the reproach of these hospitals will be abolished. All public buildings will have fresh air, free from draughts, and the carbonic acid in churches will no longer cause us to sleep through the sermon.

In conclusion, I may say that I have found this revolving fan practically noiseless; and at the morgue, the water flowing away after acting as a motor could be carried off in a two-inch pipe.

For warming cold air in our public institutions, the air of entry can be passed through a small Bunsen's gas or other furnace—a cheap as well as safe and convenient method.

For cooling hot air, the air of entry is passed through an ice chest, a freezing mixture, or through a metallic coil under water.

WHAT BECOMES OF THE TYPHOID GERM IN SEWAGE FARMS?

By Andrew Shields, M.D.

The question now put takes for granted, that typhoid germs reach those grounds where sewage irrigation is practised. In water-closet towns, typhoid excreta must often be added to the ordinary sewage, and where this is placed on the land, the germs of the disease must be deposited there. This being granted, the question arises—"What becomes of these germs after reaching the farm?" Is that their final destination, where they are either destroyed, or deprived of the power of doing further harm?

On the other hand, does filtration through the soil accomplish this only imperfectly, and still leave the effluent water a source of danger to the public health?

While percolation may purify the sewage so far as the senses can discern, and the dead organic matter become broken up into soluble salts, &c., for the food of plants, does the process at the same time remove all disease germs, including spores and poisonous products. I am not aware that this particular aspect of the subject has been thoroughly determined.

That a sewage farm may be so managed as to prevent the occurrence of typhoid fever, or other zymotic disease, on the farm itself, must be admitted. The evidence on this point seems generally well established. So far back as 1863, Sir Robert Christison, in an address on public health, expressed his opinion respecting the effects of sewage irrigation in the following terms:—"If there be any doubt as to the general salubrity of the now famous meadows of Craigentinny, there is none at least as to the total absence of ague among the inhabitants. I have recently been making careful inquiry respecting this famous and somewhat unsavoury institution. Many years ago, my own prejudices were all against the meadows. I have been compelled to surrender them. I am satisfied that neither typhus or enteric fever, nor dysentery, nor cholera, is to be encountered in or around them, whether in epidemic or non-epidemic seasons, more than in any other agricultural district of the neighbourhood. I think it right, in reference to the late introduction of the Craigentinny system of irrigation into the vicinity of other large towns, that these precise facts should be known."

The correctness of these views has been confirmed by subsequent experience; and we find Dr. Carpenter, of Croydon (England), at the annual meeting of the British Medical Association held in Glasgow, August 1888, stating:—"That sewage farms, if properly managed, do not set up either parasitic or epidemic disease among those working on the farm, or among the cattle fed upon its produce."

The fact, however, that those engaged on the farm do not suffer from typhoid fever, or other diseases of a like kind, does not settle the question now under consideration. There is no evidence that persons working on the farm, or the families residing in the neighbourhood, are in the habit of using the outflow water for household purposes. If it could be shown that the effluent at these farms was constantly used by

old and young alike, and that no disease had arisen from drinking such water unboiled, then a most convincing proof would have been established. But so far as we know, no proof of this kind is available, or likely to be so.

It may be said that this is putting the matter in an extreme form, and that it would be absurd to expect people in their sound and sober senses to run such a risk. We admit the experiment would be a hazardous one, and indeed far too dangerous to be put to the test; but this only shows the weakness of the argument, viz., that the water must be safe because instances are known where it has been drunk without any bad effects.

It must be evident, that an occasional occurrence of this kind is no criterion that such water is free from poisonous germs. It is well known that some persons are less susceptible to infectious disease than others, on account of age or other conditions. Exposure to the contagion of small-pox does not always result in infection.

Dr. Carpenter allows there would be risk in using the water from sewage farms, for he adds:—"It is not however argued, that the effluent water is safe for dietetic purposes." He thinks, however, that it is "fit for discharge into any ordinary stream, provided the area treated is not less than an acre for each 250 persons." * But if the water is not fit for household purposes, is it safe for discharge into a stream which affords a water supply for domestic use? It is true Dr. Carpenter does not explain what he means by an "ordinary stream," but it may be inferred that he means a stream which supplies water for human consumption, otherwise there would be no point in the statement.

No one disputes that the outflow from a sewage farm may be discharged into any water-course which runs direct into the sea, without being further used. If all sewage farms were on the sea coast, or on tidal estuaries, it would be a matter of no practical importance whether the germs of disease passed out with the effluent water or not. It is altogether a different thing when the filtered sewage flows into a stream which supplies a number of inland towns with drinking water. This is a subject of special interest in our Australian colonies, where the pollution of rivers and creeks is now a matter of the gravest concern.

Sewage farms are now much advocated in Europe, and already the principle is in operation and finding favour in Australia. It would be well, therefore, to ascertain whether the process can be carried out as safely inland as on the sea coast. It is agreed that neither chemical analysis, nor the senses, can determine this point, and experiment cannot be made with human life. Until, therefore, bacteriological science has settled the question definitely, we are not justified in saying that the effluent from a sewage farm is fit to discharge into a stream which supplies towns or villages with drinking water.

The experience of Lausen, quoted in the sixth report of the Rivers Pollution Commission, seems to prove beyond a doubt that the poison of typhoid may undergo what appears a very efficient natural filtration, without losing its activity. (See *Lancet*, August 13, 1887.) In that epidemic, the typhoid germs or spores had "filtered through a mile of

* *British Medical Journal*, August 25, 1888.

earth,"* and yet retained their vitality and power to cause an outbreak of fever. Although the filtration, in the case now mentioned, intercepted particles of wheaten flour, it was not sufficient to prevent the typhoid microbes from passing through.

Considering then that typhoid germs are not only living, but probably highly tenacious of life, and capable of multiplying in river water, as found by Wolffhuegel and Riedel, the danger of allowing them to pass into ordinary streams becomes more apparent. Their power of living in river water and causing an outbreak of typhoid fever has recently been shown in America, as given in the following extract from the "Annual of the Universal Medical Sciences," Vol. V., p. 228:—"The capacity of river water, as a medium for the propagation and cultivation of pathogenic germs, has been illustrated in the Ohio Valley. At many towns on the Ohio River, extending a distance, by river, of over 800 miles, nearly every town obtaining its water supply from the river was more or less infected by typhoid fever." The epidemic of typhoid fever was attributed to this source, because it was demonstrated by Brouardel's method that the typhoid bacilli existed in the water of the Ohio River. This shows that the self-purifying power of rivers does not hold good with respect to the typhoid poison, whatever it may do in the case of other kinds of matter.

In conclusion then, we affirm that, although land-filtration has a remarkable power of clarifying sewage, and of breaking up the organic matter, that of itself, is no proof that the effluent water is free from typhoid microbes and fit for discharge into streams which supply water for human consumption. How far typhoid excreta should ever be allowed to mix with water at all, except what finds a direct and quick passage into the sea, is a matter of much practical value at the present time, when sewage farms are gaining favour in these colonies, but the question is one which we do not enter upon at present.

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* *Sanitary Record*, July 15, 1887.

SECTIONAL MEETINGS.

The meetings of the Section were held in the Chemical Lecture Room of the University. In the absence of the President and the Vice-Presidents, Dr. McCrea, of Victoria, presided at the first meeting; the President, Dr. MacLaurin, taking the chair upon the following days. Letters expressing regret at absence, and wishing the Congress every success, were read from the Vice-Presidents, Drs. Waylen, Johnston, and Smart; from Dr. Alfred Carpenter, Vice-President of the British Medical Association; Professor Kelly, of King's College, London; Drs. Edward Ballard; Brown, of Belfast; and Spoof, of Abo. Numerous diagrams and publications, illustrative of sanitary matters, were at the disposal of members, for which the thanks of the Section were given to the Local Goverment Board, Whitehall; the Central Board of Health, Melbourne; the Medical Officer of Health, Belfast; and Dr. Spoof, of Abo.

Upon the Question of Cholera Quarantine.

Drs. McCrea (Victoria), Creed (New South Wales), Whittell (South Australia), and Springthorpe (Victoria), supported the present system of quarantine, as the best preventative measure under our special circumstances, without expressing any opinion upon the course which might be most suited to a country so differently situated as England was.

Dr. Kirtikar admitted that his paper applied rather to European practice, and to European authorities his argument was, "Why take our grain, and refuse admission to our people?"

Upon the Question of Leprosy in Australasia.

Dr. MacLaurin mentioned a recent case, occurring in a Chinaman of a better station in life than the ordinary.

Dr. Milford (Sydney) said that leprosy had been found in patients of European origin up in the bush, the origin being apparently bad food and hygiene. In 1878, two such cases were reported.

Dr. Jakins (Victoria) pointed out how Victorian cases had all been hopeless, though the Bombay Government quoted a large percentage of recoveries in their special sanatorium.

Upon the Question of Australia as a Resort for Consumptive Patients.

Dr. M'Mullen (New Zealand) considered that it was no wonder if ignorance upon the point prevailed in England, seeing the absence of exact knowledge of our different climates amongst ourselves.

Dr. Jakins (Victoria) had known many cases of arrest since his arrival in 1864. Some got worse if they remained on the sea-coast, others if they went inland. The only test was a practical trial.

Dr. Mackintosh (South Australia), after thirty-two years' experience in South Australia, considered that, if cases came out early, they were greatly benefited, even cured; but that, if the lungs were breaking down, the hot winds aggravated the symptoms, and hastened death.

Dr. Toll (Health Officer, Port Adelaide) agreed that South Australia, especially the northern parts, suited the early stages, but was injurious in the latter stage. He found that most cases were sent out too late.

Dr. Hudson (New Zealand) knew many cases, even of cavity, which had benefited very much by coming to Australasia. As an English winter was almost certainly fatal, it would be scarcely right to tell English physicians not to send any but the early cases. Certainly, better ventilation was wanted on the voyage, and more discrimination as to the place to which the case was sent.

Dr. Creed (New South Wales) agreed that it would be unwise to forbid patients coming to a place where they were likely to improve. What was wanted was more definite directions.

Dr. Springthorpe (Victoria) believed that one outcome of the Section would be more exact knowledge on our own part of the climatology of Australasia. Then the best destination for patients, the seasons, conveniences, &c., would soon be recognised at home also.

Upon the Question of Specialism in Medicine.

Dr. Jakins (Victoria) considered that, as no man could be thoroughly acquainted with all branches, it was a good thing for both the public and the profession, that specialism existed.

Dr. Hudson (New Zealand), as a general practitioner, coincided.

Dr. Hooper (Victoria) thought that specialism could be objectionable only when it ran riot.

Upon the Question of Pasteur's Mode of Exterminating Rabbits.

Dr. Wigg (Victoria) apologised for being unable to bring forward his paper as promised. He had gone carefully into the proposal of M. Pasteur ever since it had been first suggested. He was so satisfied that it would be most unwise to introduce such a remedy into our conditions, without requiring the most stringent tests, that he had brought the matter before the Royal Society of Victoria, where his views had been unanimously endorsed, and resolutions to that effect brought under the notice of the Government. Since M. Pasteur's representatives had come out, he had gone carefully over their laboratory, &c., on the island in Sydney Harbour, and he had come to the conclusion, that necessary information was withheld; that the representatives of M. Pasteur seemed anxious to rush the experiments through in a few weeks; that the arrangements were too clever to be practicable for our purposes; nor could he find any work being done.

Dr. Taylor (Queensland) stated that M. Pasteur's representatives were reported to have complained that the Rabbit Commission had not treated them with sufficient fairness, and asked what truth there was in such rumour.

The President (Dr. MacLaurin, Sydney) had been until recently a member of the Commission. While a member, he was sure that there was every desire on the part of the Commission to facilitate the work of the representatives. In his opinion, the ideas of Pasteur's representatives upon the question were too indefinite, and insufficient to give satisfaction to the public of these colonies. The Commission had had to undertake its own experiments, which were of an elaborate character. It was quite possible that M. Pasteur's representatives were dissatisfied. Perhaps the stringency of the regulations was objectionable to them. After very careful investigation, the Commission had concluded that

Pasteur's plan was not efficacious here. Thus, speaking simply for himself, and not for the Commission, the microbe recommended produced constipation in rabbits, and not diarrhœa, as in chickens. Hence it was not excreted; and there was no reason why other individuals should become attacked, and practically, others were not, when the animals were not domesticated. Possibly some little personal feeling had crept into the question, but the Commission simply wanted the truth.

Upon the Question of the Attitude of the State towards Quacks and Quackery.

Dr. MULLEN (Victoria) upheld the Medical Practitioners' Act, 1865, as equitable, though imperfect in details. He considered it impossible to prohibit quackery, and to be unjust for the State to do more for qualified medical men than register them, restrict to them certain recognised titles, and legal status. He considered the action of the Chief Secretary of Victoria, in not allowing the police to prosecute unqualified practitioners, as perfectly legal.

Dr. CREED (Sydney), as Chairman of the recent Commission which had exposed the extent of quackery in New South Wales, spoke from a full knowledge of the subject. He agreed that prohibition was impossible, but maintained that the spurious should be labelled spurious; that for State requirements only the genuine should be selected, and that the public should be put in a position to discriminate the true from the false.

Dr. MORGAN (Newcastle) pointed out how badly they were in need of reform in New South Wales, where the quacks were a powerful body, and did infinite harm to the public. Further, they were recognised by the State; for unqualified men acted as Coroners and Justices of the Peace, give medical evidence, signed certificates of death, and held hospital appointments.

Dr. SPRINGTHORPE (Victoria) pointed out that the defects in the Victorian Act were—the mode of election of the Board, the absence of power to erase names, the scanty requirements for registration, and the absence of explicit powers of prosecution. The complaint against the Chief Secretary was, that he had actually forbidden the police to act upon information received, though they had so acted for many years. At present no one would prosecute, and quacks were flocking over from New South Wales.

Dr. TAYLOR (Queensland) urged the necessity of reform as a matter of vital importance.

Upon the Question of the Sanitary Condition of the Different Colonies.

Dr. TAYLOR (Queensland) regretted that, owing to unavoidable circumstances, Queensland was not represented in the list of colonies which had reported their sanitary status.

Dr. WHITTELL (South Australia), though not advocating centralisation in all things, considered that the great want in sanitary matters was a powerful central authority. He had thought it a mistake when, last year, Local Boards of Health had been established, and the powers of the Central Board curtailed. After a year's experience, he was more convinced than ever that such establishment was a mistake.

Dr. A. SHIELDS (Victoria) said that the Central Board of Health for Victoria was the most abused body in the colony, and had a very hard uphill fight to wage—so that such testimony was reassuring.

Dr. APPLEYARD (Tasmania) pointed out that Tasmania enjoyed a fair Registration Act, and a stringent Vaccination Act.

Dr. BONNEFIN (Victoria) considered the state of Melbourne more than scandalous. He looked for reform, mainly in the education of the public, and considered that medical men should work towards this object more than they did.

Dr. LEGER ERSON (New Zealand) considered the present sanitary executive in New Zealand, as worse than useless.

Dr. MORGAN (Newcastle) deplored the sanitary condition of New South Wales. It was simply, that the public and the local authorities were entirely ignorant of what should be done. The profession owed it to itself, to band together and make its influence felt, in the direction of speedy reform.

Dr. SPRINGTHORPE (Victoria) trusted that the Section would not separate without taking some practical step towards showing the Governments of the different colonies the opinion held by it, upon the sanitary condition of the colonies.

It was thereupon decided that the President (Dr. MacLaurin) and the Secretary, Dr. Springthorpe, should draft a series of resolutions for the consideration of the Section. The following resolutions were accordingly drafted, and unanimously agreed to:—

(1) "That this Section of the Intercolonial Medical Congress, 1889, urges upon the notice of the different Governments of Australasia the necessity which exists for fresh legislative enactments in all the colonies, with a view to obviate the grave dangers to public health which everywhere prevail, and which, in many cases, are due to easily removable causes."

(2) "That, in the interests of the public, this Section of the Congress urges upon the various Governments of Australasia the necessity for amendments in the laws relating to the position of medical practitioners, in order that the public may be in a position, at all times, to protect themselves against the impositions of unqualified persons."

(3) "That copies of these resolutions be forwarded by the Secretary to the Federal Council, and also to the Governments of the different colonies."

It was then decided that Dr. Springthorpe should bring these resolutions under the notice of the general meeting of the Congress, so that, if possible, they should receive the sanction of the whole Congress.

The Section then adjourned.

SECTION OF ANATOMY AND PHYSIOLOGY.

PRESIDENT'S ADDRESS.

By T. P. Anderson Stuart, M.D.

Professor of Anatomy and Physiology, and Dean of the Faculty of Medicine in the University of Sydney.

In an address on Anatomy and Physiology, one may either speak of the subject matter, as one would before a number of specialists in these branches of learning, or one may treat them in a more general manner as one would before a purely lay audience; speaking, for instance, of their value as a discipline, or means of education, or of their value in relation to the art of healing. Further, one may deal with them historically as they were in the past, descriptively as they are at present, or prophetically, one may form anticipations of their future. I think I shall be most in harmony with the nature of this meeting, if I take up more or less of all these lines.

On the Scientific Culture.

Before an audience of scientific men I do not need to advocate the training of the mind in science and scientific methods, as a means of education and culture. That the scientific mode of thought and habit of mind fosters the love of truth for its own sake, and constitutes a thoroughly effective mental discipline, no member of this Congress will doubt. That there is, in the cultivation of science, something which imparts a culture in as true a sense as does the study of letters, I do not need to urge here. That the recognition of a scientific culture as such is spreading among men, anyone who notes the signs of the times can perceive. But this tardy and partial recognition has come only after being fought for and struggled for, and the struggle is not yet over. Thus it has all too often happened, that the scientific man has had to waste in contention, time and energy which he would fain have given to his proper work. It should be added that the struggle is not peculiar to Australia—it comes from the older lands. In a sense, therefore, the legend of the University of Sydney is only too true—"*Sidere mens eadem mutato.*"

The attitude of the ancient Universities of Oxford and Cambridge is worthy of notice in this connection, for in these homes of culture,

medical schools have been revived within the last few years. In some departments, Cambridge is already worthy of the designation of the "great" school of medical science, and Oxford is making steady progress; and it is of interest to us in this place to note that both these schools of medicine date their real revival from the establishment of schools of physiology. Perhaps, in some measure connected with this academic recognition of medical science, there has, in recent years, I am told, been a distinct improvement in the manners and habits of medical students. Bob Sawyer is now as dead as Julius Cæsar. And yet, let the tree be judged by its fruit; for when we think of the confidential relations which must of necessity exist between medical adviser and patient, when we remember the varied and oft-repeated temptations that beset the medical man in his practice, and when we think how seldom he has been found wanting, surely that medical and scientific education cannot have been a bad thing, when it could make such men out of such students.

The Physician must be a Physicist.

The progress of Physiology during its period of marked progress—say the last quarter of a century—shows very clearly that the energies at work within the body are in no wise different from the energies at work in the world without it. The sole difference is in the stage on which they play their parts. Time was, and not so very long ago, when a "vital" force was believed in as it now no longer is, and the phenomena of life were thought to be approachable only on lines somewhat different from those on which we would take up the phenomena of the world around us. But now, the whole tendency of the time is to show that vital manifestations are phenomena to be studied as other phenomena are; and more and more is it clear, that the methods and laws of Physics are to be applied in Physiology. The physiologist is but a student of physics in so far as concerns organised things, to the right understanding of which he must add also a knowledge of their structure. And—like the experimental physiologist—the physician, too, is constantly called upon in diagnosis and in treatment to make experiments, to record observations, and to work out problems more or less physical—in optics, in acoustics, in hydraulics, in mechanics, in electricity, and so on. For instance, the physician now employs electricity to obtain heat and light, to coagulate blood, to modify the nutrition of the tissues, as in the restoration of wasted nerve and muscle, and the dissolution of tumours, &c. The physician even uses the galvanometer, and prescribes doses of electricity in milliampères, as he would prescribe degrees of temperature, or weights of drugs.

But it may be urged that the physicist must needs be so good a mathematician, that a fair knowledge of physics is beyond the average mathematical attainments of the average student of medicine. This, however, is not the case--some mathematics he must know, but not so much as is often assumed; for indeed there are not wanting examples of men of high attainments in physics who were of but moderate mathematical attainments. I mention this, because I desire to urge the study of physics as a *necessary part* of the training of the medical man, and accordingly, I wish to show that a lack of an advanced knowledge of mathematics need not stand in his way.

The proper position of the study of physics in a curriculum is not difficult to settle. It must be at the beginning, and it is a matter of no importance what it is called—it may be part of a preliminary scientific training, or it may be the beginning of the medical course—it is enough if it be there. But this raises the question of what the preliminary training of a medical man should be—a question of extreme importance in these colonies where medical schools are young, and, like other young things, plastic, because free from the trammels of use and wont; and largely free also, though unfortunately, from the influence of a medical public opinion—an influence, the absence of which on many grounds, is greatly to be deplored, but a contribution to the creation of which will, I trust, be one of the chief results of this Congress. The question takes us even further back—it takes us back to the school training.

I confess that I am not sure how far the teaching of what is ordinarily called science may be introduced into primary schools, but I have no hesitation in saying, that some measure of elementary scientific teaching should be given to all children, without distinction. To the boy who will afterwards get such teaching at the University, where, in all likelihood, he will begin at the beginning, it is not a matter of such moment; but for the great majority of boys, who will not get any instruction at all in natural science if not at school, it is a matter of the very greatest importance. Of course, what I say of boys, I say equally of girls.

It is unfortunately the case that, as yet, the best teachers are nearly all literary and mathematical teachers, and consequently, the best teaching is still exclusively of a literary and mathematical nature. So long as the teaching of natural science in schools is a sort of extra thing, done at odd times, done in most insufficient measure and too often in an inefficient manner; so long as the study of letters and abstract mathematics thus completely overshadows the study of everything else, so long must the present unsatisfactory state of matters continue.

In parenthesis, as it were, I would strongly urge the teaching of drawing to every child in the school. I do not necessarily mean

more than the drawing of a straight line, of a good curve, of a proper angle, and such like, so that in after life, ideas may more frequently be conveyed by figures instead of by words only. The efficiency of this description by pictures, as a training of the faculty of observation and of the mind, is not, I think, questioned in theory, though sadly neglected in practice. The ancient Mexicans—a wonderful race—had no other mode of recording ideas. I would likewise urge the more frequent training of children in the art of verbal description. All sorts of objects should be placed before them, and they should be required, after due observation, to write down in words just exactly what they find. Such an exercise would be at once a training in observation, in composition, grammar, spelling, and writing. All teachers of science complain of the many young men and women who come to them with their eyes wide open, and yet seeing nothing whatever. This faculty of description is in a large measure to be acquired by practice, as every teacher of anatomy can testify.

The New Medical Curriculum of the University of Sydney.

Amongst other things, we have secured for students the training in physics, of which I have spoken. Sydney, as regards the medical curriculum at least, is now well in the van of progress. Thus, in Australia, we were thinking on the same lines as they have been in the United Kingdom. The time is evidently ripe for the change. Here, we had carried out, what there they are still only thinking about.

Perhaps I might be permitted to say a word on the curriculum which we have striven to make as perfect as practicable, and which—as finally passed by our governing body only last month—is, of course, probably the latest thing of the kind.

As a guarantee of a sufficient general education, we require a degree in arts or in science, or failing a degree, a year's attendance on the classes of the first year of the arts course, together with the examination at the end of that year. As an alternative, we have now as an entrance examination, certain subjects of the Senior Public Examination. After this follows a course of five years' duration. The student is mainly concerned in the first year with physics, chemistry, and biology; in the second and third years with anatomy and physiology; in the fourth and fifth years with the more special departments of medical science.

In every department, practical instruction is insisted upon. It is our desire to educate and train, rather than merely to instruct and cram. Further, we recognise that, while examinations of some sort are necessary, they are not an unmixed good; and in our practice, we have to some extent anticipated the remedies suggested in that much-needed

signed protest, and the accompanying comments, published in the November number of the *Nineteenth Century*. We try to minimise the evils of the examination system as follows :—In the degree examinations, the results of the class examinations, which are compulsory, and are conducted during the course by the teacher alone, *may* be taken into account ; there is an interval of two years between the first and second examinations ; the teacher is co-ordinate in every way with the associate examiner ; in every subject a practical or *vivâ voce* examination follows the written paper ; there is no separate honours examination—honours depend on the high excellence of the student throughout his whole career.

We have made compulsory a course of ophthalmic medicine and surgery, and a course of psychological medicine. Requiring attendance on a course of instruction in logic and psychology, is a new feature. Thus the student becomes acquainted systematically with the general methods of science—with, as it were, the grammar and syntax of science, and is introduced to many of those problems of philosophy which have occupied the minds of men in the past, and which, from the nature of his daily work, can hardly fail to occupy his own. Also, by making it part of the Bachelor's course, we avoid that annoyance so often experienced by the Bachelor proceeding to the Doctorate, when he finds that he has still to pass in logic at a period of life when such examinations are peculiarly distasteful. These are steps in the right direction, which I am bold enough to commend to the attention of the General Council of Medical Education and Registration, and of most British licensing authorities.

Another point worthy of notice here is, that at the end of the first three years of our medical curriculum, the student can, with some extra work, obtain the Bachelor of Science degree. The science and medical curricula are now made practically identical as regards the first year, and we reckon that the next two years' medical study will, with some additional and advanced work, make up the requisite three years' work in science, so that the best and most industrious students of medicine can acquire a degree in science. We thus seek to emphasise the fact, that the earnest man of medicine, is a man of science in the truest sense of the term.

The Improvement in Teaching Methods.

Nothing, I am frequently told, strikes men who have received their teaching in the not very distant past, so much as the great care that is now taken to see that every student, in each department, shall have the maximum of practical work and the relative minimum of book work. The illustration of lectures is now carried to an extent before unheard of. I have heard it remarked that we make things too easy for students

nowadays. I cannot think that; for with the advance made in teaching methods, there has been an enormous expansion of the subjects in every direction. I think we may assume that the best text-books contain a statement of what is fairly established. On this assumption, an examination of some of the standard text-books is very instructive, as showing the rate and extent of the expansion of our sciences. Thus "Quain's Anatomy" was first written by Jones Quain alone; in the later editions, there are always three editors. The third edition, in 1834, had no illustrations, and only 467 pages (when its actual 855 are reduced to the present standard); the sixth edition, in 1856, had 356 figures in 1096 pages (its 1635 being reduced to the present standard); and the last, the ninth edition, in 1882, has 1194 figures in 1617 pages.

Some Account of what Anatomy and Physiology have been Doing during Recent Years.

While the influence of the doctrine of evolution has extended to every department of knowledge, it has influenced our own branches of science more directly than any other, and to it we owe much of our progress. It is as pre-eminently the working conception of anatomy, as the law of the conservation of energy is now that of physiology.

The progress of physiology has led to that of preventive, as compared with curative, medicine; and though the modern system of preventive medicine is only about forty years old, its development is now the great and high end of the efforts of medical men. The triumphs of sanitary science are now to be sought in every clime—in the barrack and in the field, in hospital construction and in hospital nursing, in the sanitary arrangements of the house, of the city, and of the entire community. In this connection, it is greatly to be deplored that the Legislatures of the world—not of these colonies only—do not see it to be their duty to do more in the way of sanitary legislation; for, as has been so wisely said, the best way to make a people happy, is to keep them healthy. This advance in sanitary matters has been greatly aided by the spread of natural knowledge amongst the people, by their greater disposition to ascribe their troubles to natural and often preventible causes, rather than to wholly inevitable workings of an unseen power, whether good or bad.

In curative medicine, physiology, through pharmacology, has played a great part lately, and is playing a greater part every day. Pharmacology, *i.e.*, the precise knowledge of the mode of action of drugs and other influences affecting the organism—rests almost solely on physiology. But on the other hand, physiology owes much to the younger science. From pharmacology, indeed, everything is to be expected. Huxley, in his address before the London Meeting of the

International Medical Congress in 1881, said of pharmacology :—" There can surely be no ground for doubting that, sooner or later, the pharmacologist will supply the physician with the means of affecting, in any desired sense, the functions of any physiological element of the body. It will, in short, become possible to introduce into the economy a molecular mechanism which, like a very cunningly devised torpedo, shall find its way to some particular group of living elements, and cause an explosion among them, leaving the rest untouched." A perusal of Lauder Brunton's " Pharmacology, Therapeutics and Materia Medica," tends to convince one that the goal is nearer than many think, for it is becoming clearer that there is a very close connection between the physiological action of a body and its physical characters, such as its chemical constitution, its atomic weight, and its spectrum.

Topographical anatomy has made such strides quite lately, that its descriptions have had to be practically re-written. This is largely the result of the method of freezing, by which the exact relations and form of the parts are preserved; this method has its counterpart in minute anatomy in the freezing and embedding methods, as for instance, in the paraffin method, which gives such beautiful series of sections in ribbons, all the sections being good and each in its proper place. In my student days, it was the fashion to say of human anatomy that it was played out, and I was quite of that mind. I do not think so now. There are still many good ears to be gleaned from the stubble in the field of human anatomy.

Embryology has made gigantic strides in recent times, unfolding not only the story of the origin of the individual, but also, in some measure, that of the origin of his kind. In teratology, it has cleared away many difficulties by showing that monsters are not *lusus naturæ*, sports, or freaks of nature, but are simply perversions of the normal type. In osteology, comparative anatomy and embryology have continued to throw much light on the meaning of the different centres of ossification in the bones of man, showing that the different centres represent distinct bones in other types. The homologies of muscles have been well worked at, and many ligaments and fasciæ have been shown to correspond to bones or muscles in other forms. Anomalies occurring in the human body have thus, in many cases, been explained. The mode of development, and the comparative anatomy of the supra-renal bodies, promise to throw some light on the nature and office of these mysterious bodies. The pineal body or epiphysis cerebri, seems to be the vestige of an early vertebrate eye, or other sense organ. As to the pituitary body, or hypophysis cerebri, much doubt still remains—either it is a vestige of the old mouth of the vertebrate ancestor, or it is a vestige of a sense organ—and indeed there are many points in the

development of the eye, and in that of the pituitary body and of its surrounding structures, that appear to be very remarkably alike, as if there had been a pituitary eye, or other sense organ, corresponding to the pineal sense organ, before the present mouth was evolved. The coccygeal body seems to be the vestige of the post-anal segment of the hind-gut, and the connection of the alimentary canal with the neural canal, through the neurenteric canal, may yet explain many things. The carotid body of man and mammals, which has a structure very like that of the coccygeal body, may it not be a vestige of the tissues around the second visceral cleft, to which it corresponds in position? The thyroid body, too, has been shown to have intimate relations physiologically to the nervous system, and has been connected with cretinism and with myxœdema; so that while still much remains to be done, something definite seems now to be known.

Pathology has made great strides, by adopting the methods of the physiologist, and now it is hardly possible to separate the two sciences. Pathology, by adopting the experimental method, anticipates nature's experiments, which, as Foster remarks, are often too complicated, occur too seldom in circumstances favourable for observation, and oftentimes are too cruel altogether.

Bacteriology has grown out of pathology, and is carried on by purely physiological methods; taken along with aseptic surgery, it has already done much, though it is really only beginning; thus it has greatly helped in the diagnosis and treatment of suppuration, pyæmia, septicæmia, rabies, &c., and the surgeon now opens without hesitation cavities which he shunned only a quarter of a century ago.

Ophthalmology owes everything to the physiologist, and mankind owes much to ophthalmology. The right understanding of defects in the structure of the eyeball and its contents, has led to their easy recognition and treatment, and thus happiness has been secured to hundreds of thousands who would have spent their lives in misery. The remarkable increase, especially of young be-spectacled people among us, is not so great an evil as many would think, and some say. It is not that prevalence of eye-troubles is on the increase in the same proportion as the use of spectacles, but it is in great measure simply because defects of vision are now successfully treated by spectacles, which, in earlier days, could not be treated at all. You doubtless remember that it is only thirty years since Mackenzie, author of the well-known book on "Eye Diseases," used to recommend his hypermetropes—then known as asthenopes—to emigrate, in order "to follow the pastoral pursuits of an Australian colonist," so that they might have as little necessity as possible for near vision. That single physiological instrument, the ophthalmoscope, invented by Helmholz less than forty years ago, what

has it not done for eye diseases, whether of the fundus or of the refractive media? and see, too, how it has carried us a step farther back, for by letting us inspect the retina, it has virtually let us see a portion of the brain, with all its vessels and tissues spread out to our view, and so has given birth to the whole department of medical ophthalmoscopy.

Physiological chemistry, from which we cannot separate pathological chemistry, has profited by the general advance in organic chemistry, and we need not be dissatisfied with the apparently slow progress in this most intricate subject. It has already done much for the practitioner of medicine in diagnosis, and its contributions to treatment in the way of artificial digestion of food stuffs, and of alimentation *per os* and *per anum* have proved of the very greatest value. From physiological chemistry, great things are to be looked for in the not very distant future.

While the labours of so many have of late been directed to the life-history of organisms of such exceedingly insignificant size as micrococci, bacteria and bacilli, and yet, with activities so immensely important to all living things, at the same time there has been steadily accumulating a more intimate knowledge of the ultimate structural elements of the higher organisms—of cell-structure and cell-function—a knowledge which also concerns masses of extremely small size. This increased knowledge of the cell, owing to the universality of its object, is destined to exercise the greatest influence in anatomy, physiology, and pathology.

Improvements in the methods of histological research—of fixing the ever-changing protoplasm, and of staining it—improvements in the making of lenses, together with improved methods of illuminating the object—have disclosed the fact that, within the cell, a series of visible transformations occur, which accompany its activity. A certain group of these changes leads to the cleavage, or reproduction, of the cell; the substance of which, for this end, passes through an orderly series of stages which, with certain accidental variations, retain their essential characters in all cells yet examined. Every month reveals some new object in which this process of "karyokinesis" is discovered, and it seems hardly too much to say that, in this visible process, whereby the ultimate constituents of the tissues are reproduced, we have one of the fundamental characters of organised things. Perhaps undue stress has as yet been laid on the nuclear changes, because these have been so prominent, owing to the easy pigmentation of part of the nuclear substance. That important changes go on in the surrounding cell substance during karyokinesis is evident, from the re-arrangement of the granules in the substance, and from other appearances. These visible changes are but an indication that change—change visible and

invisible—is to be sought in the cell, which is thus as much the physiological, as it is the anatomical, unit. But the histological unit of the complex organism is so much akin to the whole body of the unicellular organism, that it is with good reason that so much attention is being directed to the study of the lower forms of life.

There can be now, to my mind, very little doubt that there is a "cellular" anatomy, or, using the word in its physical rather than its chemical sense, a "molecular" anatomy which, though invisible to us, is yet hardly less varied than is the visible structure of larger masses. We would, on this assumption, account for—I do not say explain—the different results that flow from the development of such apparently similar things as one ovum and another—they were really very different from the beginning, only we had not the means of appreciating the difference.

Comparative physiology will one day show us that there is as intimate a connection between the vital manifestations of the various kinds of animals, as comparative anatomy has already shown to exist in regard to their structure. Indeed, if we assume that function and structure are correlative, then a complete comparative physiology follows a complete comparative anatomy, as a necessity. Accordingly, Goltz, who has made out so much of the physiology of the frog, and then shown that what he observed in the frog was largely to be found in mammals, says that he will not be surprised if he some day sees a dog without a cerebrum feed itself, since Schrader has proved that a frog without its cerebrum can still catch flies. Perhaps such a dog will also be able to run about, and to see as a rabbit can, without its cerebrum.

On the Functions of the Cerebrum.

No one can read Macewen's address at the meeting of the British Medical Association, in Glasgow, without seeing that a new era has dawned in surgery. Thanks to the labours of the anatomist, in accurately describing the arrangement of the convolutions and sulci, and their relations to the cranial walls and surface markings. Thanks next to the pathologist and physiologist, for determining the relation of certain parts of the brain's surface to the movements of the different parts of the body of man and of the lower animals. Thanks, lastly, to aseptic surgery, in enabling grave operations to be performed with wonderfully little risk to the patient from the operative procedure itself; the surgeon is now able to cure or relieve many cases which, before the year 1870, were altogether beyond the pale of surgical interference. The first work was done as a matter of pure science; the first workers had no idea that so soon would their labours be turned to practical account. Even the general public cannot fail to recognise the stride surgery has

taken, when it is told that the surgeon can, from a consideration of symptoms only, so accurately determine the situation of, say a tumour, or of a depressed piece of bone, or of an effusion of blood, or of an abscess on or in the brain or spinal cord, cut down on it, and remove the one or evacuate the other, with such security that, as in Macewen's cases, eighteen recoveries followed twenty-one operations; and the three that died were all *in extremis* when operated upon. While then, clearly, we have established *some* physiological connection between the cerebral cortex and the peripheral parts of the body, when we enquire what is the nature of that connection, we are immediately in difficulties, and this leads me to speak of the physiology proper of the cerebrum.

The March number of "*Pflueger's Archiv*" contains a most interesting and important work by my former teacher, Professor Goltz, of Strasburg, in which he describes the results of his recent work on the brain. The most important case he describes is that of a dog, in which was removed, at three operations, the entire left cerebral hemisphere, including the corpus striatum and the optic thalamus. The dog lived in perfect health for fifteen months, when it was killed, in order to ascertain the exact condition of the nerve centres.

When the immediate results of the operation had passed away, the dog appeared—apart from the effects of its having only one eye—a quite healthy and well-bred animal, friendly to friends, but yet disposed to growl when enemies were about. In the various movements of its body and limbs, it did not manage the right side just so well as the left, but this was noticeable only by an attentive and practised observer. While the tactile sensibility of the right side was distinctly diminished, there was not a spot which was not sensible. It held a bone with its forepaws, using them as hands, and when food was placed on a board at some little distance in front of the bars of its cage, it would first try to get it in by using the left forepaw, but if this failed, did not hesitate to try with the right forepaw, so that it still could voluntarily control the movements of the right side. Briefly, then, while the sensibility of the right side was diminished, no part was insensible, and while it preferred to use the muscles of the left side, it could move any one of the muscles of the right side. Thus, each side of the cerebrum must be connected with every voluntary motor area, and with every tactile sensory area of the body.

The bearing of this case on our notions of cerebral function is obvious. It entirely discountenances the notion of the existence of small circumscribed centres on one side of the cerebrum, that have an indispensable connection with muscular and sensory areas on the opposite side of the body; or that in these cerebral areas alone arise the will-impulses which eventuate in voluntary movements of the opposite side.

The dog could use every muscle of the opposite side, and from every part of that side it could be stimulated to movements that could be the results only of conscious sensation, and yet the so-called centres were simply not there. Had the cortex only been removed, the recovery might have been due to the basal ganglia taking up the functions, but then they too were not there; and, further, Goltz says that he will soon publish a case in which one crus cerebri was severed without being followed by permanent paralysis, either of sensation or of motion, on the opposite side of the body. Evidently, then, one side of the cerebrum can take up the functions of the other.

The next question that arises is, can any part of one side take up the functions of any part of the other side, or can only the symmetrically corresponding part of one side take up the functions of the corresponding part of the other? For the answering of this question, Goltz gives some material.

After destruction of the anterior part of one side of the cerebrum, an inexperienced observer would say that the dog was quite normal, though a trained observer would notice that the limbs innervated from the intact side are preferred, and are more deftly managed.

After deep and extensive destruction of the anterior moieties of both cerebral hemispheres, while no muscle is paralysed, yet movement is permanently and gravely affected; the dog walks heavily and clumsily; it cannot feed itself at all, or does it only with difficulty, and it can no longer use its forepaws as hands. It no longer gives the paw when asked.

From these experiments, Goltz concludes that the frontal lobes of the cerebral hemispheres contain parts which can take the place of each other. If one is destroyed, the animal's movements remain fairly normal only so long as the frontal lobe of the other side is uninjured.

On enquiring a little more minutely into the question, it would seem that it need not, of necessity, be just the symmetrically corresponding part of the opposite frontal lobe which takes up the functions; for if the so-called hind-leg centre be removed from the left side of the cerebrum, the dog shows both motor and sensory disturbance of both the hind and the fore limbs of the right side of the body; but in a little time, this disturbance disappears. If now the symmetrically corresponding part of the right side of the cerebrum be removed, a similar disturbance is noted, chiefly affecting both the fore and hind limbs of the left side; but after a longer period than before, this too, nearly disappears. (In neither of these cases are the disturbances confined to the limbs.) Now, had the right centre alone taken up the work of the left centre, after the latter had been removed—had thus the one centre alone innervated all the limbs, the disturbance after the second operation ought to have equally affected all the four limbs.

Such results would be analogous to the effects of electrical stimulation of a so-called centre, which, having taken up the functions of its fellow, should evoke movements of both sides—if weak, it evokes movement only of the opposite side. Further, if small portions of one side be removed at several operations—the operator waiting in each case till after the permanent condition has been established, *i.e.*, till after the transfer of function has been effected—then each succeeding operation is followed by a repetition of the same group of symptoms as the one before it was followed by, only the symptoms are developed to a greater degree each time. Now, had the centres of one side already taken up the functions of the portions removed from the other side, it could scarcely be that the same group of symptoms would follow each succeeding operation.

After extensive destruction of both occipital lobes, the tactile, auditory, olfactory and other senses are impaired, but movements are just about as cleverly carried out as in a normal dog. It may still give the fore-paw when asked, and may perform many other such movements.

If both sides of the cerebrum be operated on, but not symmetrically, for instance, if the first operation destroyed an anterior and the second operation destroyed a posterior moiety, the dog shows no more motor disturbance after the second, than it did after the first operation.

If it be objected, that such cases do not help us to understand how it is that very small lesions often produce very marked symptoms, it may, with equal justice, be retorted that the doctrine of circumscribed centres does not help us in those cases of extensive destruction of cerebral matter which we from time to time meet, without there ever having been any symptom whatever.

In regard to the immediate results of the operations, *i.e.*, the disturbances manifested before that condition is established, which may be considered as the final condition due to the removal or destruction effected, and with which alone we have hitherto been dealing, Goltz makes the following general statement:—That what is seen in the first period after a given lesion, is the counterpart of what is seen in an animal after a more extensive lesion, but at a later period. This is especially the case with symmetrical lesions of the anterior parts of the cerebrum. What is seen only for a few days with smaller lesions is the condition which remains permanently after greater lesions.

If, then, we review these observations, we are forced to conclude that, while the different parts of the cerebral cortex are *not* of equal value, as Flourens taught; and while, therefore, there *is* a sort of localisation, yet there does *not* exist anything like that minute localisation, in the existence of which many of us were inclined to believe only a

short time ago, and of which Goltz has been the constant and consistent opponent. At that time, it was thought that one had just to go all over the cerebral cortex, and divide it into areas as we would mark out a map of Australia into its colonies and counties. Some of these areas would receive impressions, others would originate impulses, and all would be "centres."

If, then, this simple arrangement has been destroyed, what have we to put in its place? It does not follow that we can put anything at all. As Goltz says, "Our real task is simply to settle accurately what kind of acts may still be carried out, and what may not be carried out, after definite lesions of the nervous system. Only a complete description of the facts can help in the performance of this task. I believe the time has not yet come when we may bring together these facts under a short formula or law."

Evidently, then, we must wait for "more light." We must simply go on recording the facts of cerebral pathology as John Abercrombie did fifty years ago, and as Goltz is doing now. When a sufficient number of observations have been recorded, the meaning of all will come out clearly enough.

On our Museums and their Classification.

The worker in science must, of course, have ready access to collections of natural objects, and the time seems to have come when we should in these new countries, where so much is done by the State, either directly or indirectly, endeavour to classify more fully the contents and aims of the different museums. I am quite aware that this is already done to some extent, but I know also that to a considerable extent it is not done, and before the evil is much greater, and therefore less easily remedied, I think we should make an effort to prevent duplication of collections, since it but leads to inefficiency as well as to waste of money.

It is, of course, only recently that museums of anatomy and physiology have been established in Australia, but already in a short time much has been done, and I take this very good opportunity of urging on practitioners of medicine the desirability, nay, the duty that for the general good lies upon them, of sending for preparation and conservation in an appropriate museum any noteworthy specimen which they may acquire in their practice. And it should be understood that when museums are beginning only, as in Australia, they cannot afford to be fastidious. It is a mistake to suppose that only rare things are acceptable. Almost anything may be sent at first, for until such time as good collections have been got together, anything may turn out to be useful, and only the curators can know what is wanted.

On Libraries of Periodicals.

Everyone here has, doubtless, felt the want of access to complete sets of scientific serial publications, without which, original work is nowadays quite impracticable. The want is all the more expressed in Australia, owing to the comparative isolation of scientific men. As "iron sharpeneth iron," so in the older countries one learns much by conversation with men engaged more or less in the same pursuits as one's self—here we are often singly distributed, and frequently at great distances apart. Until the meeting of this Congress in Adelaide last year, and of the Australasian Association for the Advancement of Science in Sydney only a few months ago, there was no organised mode of bringing together from a distance men engaged in the search after knowledge. Living then in new places, and very much alone, we do not benefit by that atmosphere of knowledge and the love of knowledge that at once stimulates to investigation, corrects observation, and suggests new lines of research. As the means of locomotion improves, as population increases, as our Universities and our schools become more fully equipped, as our citizens become more inclined to spend their means and end their days in the land where they have amassed their wealth, and when, in consequence, we have a larger cultured and leisured class, then gradually men here, as elsewhere, may learn what is going on by conversation with men; but till then, we in Australia are very specially dependent on men's writings, instead of on their living presence.

A complete Periodical Library is indeed one of our greatest wants. Original work appears first in journals and transactions, which should, therefore, be at our command as soon as possible after publication. In Sydney, I have endeavoured to supply this want; in the first place, by recommending for purchase by the University complete sets of the most important periodicals, and recently, by bringing about co-operation amongst our nine greater libraries. I find that there is an immense quantity of scientific serial literature in Sydney, but that, alas, it is in a most unsatisfactory condition—important series, if not fragmentary, are incomplete. Other, and often less important journals are in duplicate, and even triplicate, and yet withal, some of the most important are not represented at all. The work of making a general catalogue is now well in hand, and I hope to have it completed before many months are over. The enquirer will be able to see at a glance if a journal is in Sydney, what numbers there are, and where it is to be seen. The librarian will see what sets he can complete by exchange or purchase, and what sets, being taken by other libraries, may perhaps be discontinued by his own. My aim, briefly, is to have in Sydney at least one complete set of every periodical that is worth having. My dream is to have in Sydney a special Library, where all such periodicals may

be consulted. For many years, however, my catalogue will probably suffice. The catalogue will, I trust, be of value also to workers in other centres of Australia, where I hope something of the same sort may be done, so that a copy of every journal may be in the Continent somewhere. Delay is dangerous and costly. These sets are, many of them, rare now, and if procurable at all, cost an ever advancing sum of money.

It is not unworthy of being pointed out before leaving this subject, that our periodical medical literature is the pride of our profession—no other calling has anything like it. In a few months, it places the whole world in possession of every discovery or suggestion that is likely to minister to the repair of injuries, or to the prevention or cure of disease. Compare this with the times that are gone. We have it on good authority that, for forty years after they were given to the world, the teachings of John Hunter were scarcely known in France. There are thus no secrets with us. Our experience and knowledge are at once placed at the disposal of every man, woman, and child throughout the world, and so keenly do we feel this publication to be our plain duty, that we exclude from our society all who would attempt to conceal a remedy for any evil.

Quasi Cursores Vitai Lampada Tradunt.

And now I must bring to a conclusion what has proved a rather lengthy essay. I dare not hope that many words of mine will be long remembered, though I do hope that certain general impressions may remain from what I have said—as, that never were the seekers after truth in the medical sciences so numerous and so unwearying in well-doing, as they are now; never were their labours more varied nor more likely to end in the relief of suffering; never was the future brighter, nor more full of promise.

But, Gentlemen, standing as we do between the rich past, and a probably richer future, does not a great responsibility, moral and intellectual, rest upon us? As we lean upon the past, so may we expect that the future will seek to lean upon us. The physician-evangelist, Saint Luke, says:—"Unto whomsoever much is given, of him shall be much required;" and he continues, saying what is not so often quoted, "To whom men have committed much, of him they will ask the more." It behoves us then, not merely to hand on undimmed the lamp of intellectual life, but so to feed and trim it, that we may hand it on burning more brightly than we received it.

Gentlemen, let us join in breathing the ancient sentiment—"let medicine flourish"—let us echo its very words,

FLOREAT RES MEDICA!

DEMONSTRATIONS AND EXHIBITS.

By T. P. Anderson Stuart, M.D. Edin. and Syd.

Professor of Anatomy and Physiology in the University of Sydney,
President of the Section.

(*a*) Demonstrations of the Following Points in the Structure of the Eye, viz.:—

(1) The suspensory ligament of the lens in the eye of the ox is probably merely cemented to the capsule of the lens.

(2) There is beyond all doubt a hyaloid membrane bounding the whole anterior face of the vitreous body in the eye of the ox. Both these points were repeatedly demonstrated to members of the Congress.

(*b*) Demonstrations of Instruments and Models. (These Notices are for the most part merely Preliminary; Fuller Descriptions are yet to be given in some Cases.)

(1) A simple mode of showing that the form of the chest is at least largely a mechanical matter.—A loop of crinoline steel, of appropriate size, is held between the finger and thumb. When held loosely and suspended vertically, it shows the form of the transverse section of the quadrupedal chest. As it is brought towards the horizontal, it shows the form of the human fœtal thorax. Gradually, as the plane of the portion which is now gripped firmly, and which corresponds to the vertebral column, is brought to the vertical, and then leans somewhat backwards, the slope and curve of the adult human ribs are reproduced, and so also, of course, is the shape of the transverse section of the adult human chest.

(2) Simple models to illustrate the structure of the medulla oblongata.—One shows how the fourth ventricle is lozenge-shaped:—A rubber tube, about ten centimetres long and two centimetres wide, is slit along the seam for a distance of some four centimetres, in the middle of its length. On doubling up the tube, so that the slit comes into the angle, or on pulling outwards the middle of the edges of the slit, the lozenge, &c., is at once seen.

(3) The other one makes clear the relations of the grey matter of the medulla oblongata to that of the spinal cord.—The figure of the transverse section of the grey matter of the cord is painted on the ends of a flexible rubber stopper, with a central axial canal in it, and the stopper is split open down one side, corresponding to the posterior median suture of the cord; the interior of the canal is painted too. On widely opening out the stopper, the disposition of the grey matter of the medulla is at once seen.

(4) A variable spring electrical interrupter.—This was first constructed in 1887. A clamp may be moved by a double thread screw along the spring, which is fixed at one end, and figures engraved on the spring tell the rate of vibration for that length of free spring. The free end of the spring, armed with a platinum style vibrating over mercury (the level of which may be varied), makes and breaks circuit, and

an electro-magnet in this circuit keeps the spring in motion. Its uses are very numerous—*e.g.*, may be employed in place of tuning-forks, with a chronograph as a time marker. By the use of the screw, one can pass from one rate of vibration to another, without any interruption to the movement of the spring; and even with a single spring, but of course still more with one or two extra springs of different thicknesses a very great range of rapidity may be obtained. When used with an induction coil, the current driving the spring may itself be the primary current, or the spring may carry a T-shaped platinum wire, that makes and breaks another primary, though with a sliding induction machine, the latter is not needed. It may thus be used as a very efficient tetanus spring.

(5) The kymoscope.—An arrangement for demonstrating many phenomena of wave motion along tubes. It consists essentially of the tube, wound in a uniform spiral, and fixed on a frame. Each round of the spiral is one foot long, and there are twenty-four turns. A vertical glass tube is fixed in the upper part of each turn, so that the twenty-four glass tubes are arranged side by side, close together, and equidistant along the tube. The ends of the spiral tube are connected with a valved rubber ball, such as one sees in an enema apparatus. Compression of the ball injecting fluid into the tube at one end, makes a positive wave, and its expansion sucking fluid out at the other, makes a negative wave, and the pressure is sampled, as it were, at every foot of the wave's progress—the samples being placed close together, and side by side. Thus, the length of the wave is apparently shortened from twenty-four to say two feet, according to the diameter of the spiral tube chosen. Thus, a shortened wave of pressure is seen to travel along the tube, permitting the form of the wave, and many of the phenomena of wave motion to be demonstrated. It is extremely useful when used as a model of the circulation. Pieces of wire gauze inserted into the middle tubes increase the resistance here, and correspond to the capillary areas. It permits beautiful demonstrations of most of the physical phenomena of the circulation.

(6) A working model to demonstrate many of the physical phenomena of the chest, and the influence of the lung tension on the heart and the blood pressure.—On working the rubber diaphragm, the variation of the intra-pleural and of the intra-pulmonary pressures are shown by the manometers ; the lungs (represented by rubber bags, and seen through the glass jar) expand and contract, so also does the heart, and valves being added, the blood-flow onwards is seen. A coil of small rubber tube represents the lung capillaries. The action of the diaphragm (representing all inspiratory muscles) on each of these parts separately, namely, lungs, heart, vessels, is shown by separate models, the parts being combined in the complete one.

(7) An instrument for marking microscopical preparations—by making a circle one millimetre or less in diameter, on the cover glass around the object to be marked, which thus lies in the centre of the little circle.

(8) A working model of large size, twenty-four inches in diameter, to demonstrate to a class the mechanism of accommodation of the eye, as also, the phenomena of myopia and hypermetropia.—A lever handle works the springs representing the ciliary muscle (and iris), and so the suspensory ligament is slackened, permitting the lens of crinoline steel

to bulge forward, and to make the light rays, represented by flat watch main springs, cross, as if at a focus, farther forward than before, and so on. The model is anatomically correct.

(9) A working model, to demonstrate to considerable numbers the phenomena of the Sanson-Purkinje images.—Concavo-convex glasses of proper curvature, represent the cornea and back of the crystalline lens respectively. The latter forms the back of a chamber, covered in front by a very thin rubber membrane, so stretched that it is transparent enough to let the posterior images be seen through it. When this membrane is set at a particular curvature, by driving into the chamber air, water, glycerine, or clove oil, the whole apparatus, of course, represents the eye in negative accommodation. When the rubber bulb, connected with the lens chamber, is now compressed, the membrane, *i.e.*, the anterior surface of the lens, as if in positive accommodation, advances and becomes more convex; the middle images advance, approach each other, become smaller and brighter, while the anterior and posterior images remain stationary in every way.

(10) A working model, to illustrate binocular diplopia.—Representing the eyeballs, are soft white woollen balls, with the pupil and iris painted on them. The light rays are represented by long, light, sharp pointed steel wires, which thus strictly represent the axial rays of a cone. When the eyeballs are directed to an object, the wires are made to traverse the pupil, and to strike the retina, in a line with the object. Let now the eyeball be displaced, the light ray, coming from the same object, will travel in the same line, but will now strike the retina at a different place; and when now the displaced eyeball is put back into its normal position, the wire will point to the position, in space, from which the mind judges that the light, giving rise to the second image, has come—that is, to the position in space in which the object should be, so as to have its image fall on the retina at that spot. Thus, mechanically, one can demonstrate the position of the images in the different affections of the ocular muscles, and *vice versâ*, in binocular diplopia, from the position of the images, deduce which are the muscles probably implicated. The use of this model suggested a similar use of two penny pieces, where the space containing the date on the reverse may represent the corneal segment, either of a horizontal or of a vertical section of the eyeball, and lucifer matches, straws, &c., may represent the light rays. This readily-made model has been found of use in practice.

(*c*) Exhibits.

(1) Dissections of the pendants from the neck of the bell pig.

(2) A large cartilaginous skeleton, a ray, an eel, and a mullet, prepared by the glycerine-gelatine method.

THE NATURE OF VISION IN ANIMALS.

By James W. Barrett, M.D., M.S., F.R.C.S. Eng.

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Some time back, Mr. Lang, of the Moorfields Hospital, London, and the writer, were engaged in examining the eyes of animals, with respect to their refraction (*vide* "Ophthalmic Reports," 1886). A reference to the essay we published on the subject of the refractive character of the eyes of mammalia, shows that many of the eyes of animals (mammalia), are far from being emmetropic. At the time we made our examination, a number of circumstances induced us to question the truth of the common assumption, that mammals use their accommodation, not only for purposes of near vision, but also for the purpose of overcoming hyperopia. The circumstances may now be detailed:—

An examination of the eyes of rabbits, guinea-pigs, horses, cats and dogs, mice, rats, and cows, showed that they were very frequently considerably hyperopic, not infrequently astigmatic, and sometimes myopic. The hyperopia and the astigmatism were sometimes very considerable (*vide* tables), and it will be remarked that the refraction, as indicated by the method we employed, viz. retinoscopy, did not vary before and after the instillation of atropine; further, an examination of these hyperopic eyes at different times and under different circumstances, never resulted in the discovery of any variation of the refraction.

These various circumstances induced us at that time to make the following quotation, and append our criticism:—"Hirschberg writes: 'Ich will beiläufig bemerken dass vom teleologischen Standpunkt aus, beim gegebensein der positiven accomodation durch willkurlich angeregte Verdickung der Krystallinse, das axenkurze also hypermetropisch Auge am zweckmassigen erscheint.' The truth of this statement no one can doubt, if they regard the matter in the abstract; but we simply ask, what particle of evidence is there that the domestic animals use their accommodation to any appreciable extent. It is absurd to suppose that they possess an apparatus capable of overcoming eight or even four diopters of hypermetropia, and so far, we have failed to satisfy ourselves that they can overcome the lower grades." This criticism expressed our views at the time, with respect to the animals already referred to.

A reference to our publication will show also that a cat, to whose eyes strong atropine ointment has been so freely and frequently applied as to paralyse the iris, can pursue and capture mice with as much ease as under ordinary circumstances, and this too, when it is dependent on its vision, and not on other senses, for indication as to the whereabouts of its prey. In the case then of these animals, we utterly failed to find any trace of accommodation. In the case of monkeys, however, there is evidence of its existence. The examination of monkeys' eyes by retinoscopy indicates changes of refraction during its progress, and so indicates the existence of an accommodation apparatus.

With reference to the other animals, it will be noted that I have assumed that atropine will paralyse the accommodation, just as it does in man. It acts on the iris in exactly the same manner as it does in the

case of man, and I can see no good reason for supposing that it does not act on any accommodation the animals may possess; at the same time I wish it to be clearly understood, that my statements with reference to the absence of accommodation in some animals, are based rather on the constant result given by retinoscopy at different times and circumstances, than on the constancy of the result given before and after the application of atropine. Thus I am unable to find evidence of the existence of any accommodation whatsoever in rabbits, guinea-pigs, mice, rats, horses, cows, cats, and dogs; and a search through the published accounts of other men's work, fails to furnish evidence.

My next endeavour was to solve the question, by following an ingenious suggestion by Mr. Lang:—On the eye of one of these animals I performed an iridectomy. After a lapse of some weeks, I performed a second iridectomy, exactly opposite to the first one, so that the sphincter pupillæ was totally destroyed. I then instilled eserine frequently, and in strong solution, and ascertained the refraction by retinoscopy. I then waited some days, and instilled atropine frequently and in strong solution, and again estimated the refraction by retinoscopy.

Now in the case of man, the effect of instilling eserine on the accommodation is pronounced, and the average difference which would be given by such an examination is 3·58 D (*vide* "Ophthalmic Reports"). In the case of young adults, the effect of instilling eserine is to cause a temporary myopia of about 4·54 D. In the case of older persons, presbyopes, the temporary myopia produced, is 3·58 D, the average range of accommodation being 4·28 D. In the former case, the ratio of the temporary increase to the normal range of accommodation is ·65, in the latter case ·84. I therefore felt that if I could produce by this alternate instillation of atropine and eserine in the eyes of animals, a difference under the two conditions of say 2 D, that I should be justified in assuming that the normal range of accommodation in such a case was 3 D. I accordingly performed double iridectomies in a large number of animals, and in four cases examined the eyes in the manner indicated. I need only say that in order to be quite sure, I simply deluged the animals' eyes with atropine and eserine solutions, and ointments, the action of which had previously been tested on the uninjured eyes of other animals.

The results of the examination are shown in the following table:—

Table showing the Refraction as indicated by Retinoscopy, after Copious Instillation of Atropine, and after Copious Instillation of Eserine.

Animal.	Refraction under Atropine.		Refraction under Eserine.	
	Vertical Meridian.	Horizontal Meridian.	Vertical Meridian.	Horizontal Meridian.
Large black dog	R. +1 D	+2 D	+1 D	+2 D
	L. +1 D	+2 D	+1 D	+2 D
Medium sized dog ..	R. 0	+2 D	+1 D	+1 D
	L. 0	+2 D	+1 D	+3 D
Large cat	R. +0·5 D	+1·5 D	0	+1 D
Adult rabbit	R. +1 D	+3·5 D	0	+2·5 D

From this table it will be seen that, in the first animal, there was no difference in the two sets of results in either eye. In the case of the second animal, in the right eye the astigmatism disappeared under the influence of eserine; in the left eye, the hyperopia was actually increased. In the third animal, and in the fourth, the hyperopia was a little decreased by the use of eserine.

Bearing in mind, however, the difficulties of practising retinoscopy in animals (*vide* "Ophthalmic Reports," Vol. II., Part 2), and the very slight differences between the two sets of results, it is evident that the results must be regarded as identical; and so far as this investigation goes, there is not a particle of evidence that these animals exercise their accommodation. This statement must however be taken literally, and in its special application only. It is just possible that eserine and atropine are unable to influence the accommodation of animals in the same way that they influence the accommodation in men; but on the other hand, they act on the iris in a manner exactly similar. I may further say that, even if it could be proved that they are incapable of affecting the accommodation, there still remains the obvious fact, that prolonged examination by retinoscopy of the eyes of these animals never indicates any change in the refraction.

Conclusions.—(1) That examination by retinoscopy fails to indicate the existence of any accommodation in the case of rabbits, guinea-pigs, mice, rats, cows, horses, cats, and dogs. (2) That such an examination indicates the presence of some accommodation in the case of monkeys. (3) That in the case of rabbits, dogs, and cats, no difference in the refractive character of the eyes can be produced by the instillation of atropine, or of eserine. (4) From these and the other considerations adduced, it seems that in rabbits, guinea-pigs, mice, rats, horses, cows, cats, and dogs, the accommodation is either quite rudimentary, or altogether absent. (5) The vision in these animals must necessarily be much inferior to that of man.

SECTION OF PATHOLOGY.

PRESIDENT'S ADDRESS.

By W. Camac Wilkinson, M.D. Lond., M.R.C.P. Lond., M.R.C.S. Eng.

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My first duty is to express my thanks to the Committee of this Congress for the honour they have conferred on me, by inviting me to preside over the Section of Pathology. The position is not one of my own choosing, and has been assigned to me only by force of circumstances. It is a matter of great regret to us all, firstly, that the decision of the Members of the Committee—all of them determined to outvie one another in acts of self-denial—should have prevented so experienced a pathologist as Professor Allen from delivering an address on pathology; and next, that the mantle should have fallen from the shoulders of so eminent a man as Dr. Bancroft upon one so young in experience as I must confess myself to be.

In this, the Second Intercolonial Medical Congress, a special Section has been created for the consideration of subjects belonging expressly to the province of pathology. The subject of pathology, once eyed askance as an extra, a superfluous luxury, now holds a place of the first importance in a medical curriculum. Pathology enables us to interpret aright the symptom-language of disease—a language sometimes of clear, simple sentences; sometimes of vague sentences, disconnected from the context; sometimes of sentences so confused or so complicated as to baffle interpretation—and upon the right interpretation of this language, scientific diagnosis rests. Until such a diagnosis is made, all rational treatment is out of the question. Empiricism, pure and simple, is our only resource; and likely enough, fanciful systems will arise to embarrass and mislead us, for almost of necessity they will have an existence in a province where much doubt and uncertainty must prevail. But, although pathology has already reached the dignity of a science that claims special consideration, some care must be exercised in the interests of the science, lest we separate it too far from those studies out of which it springs, and to which it must always look for support—those clinical studies in the wards of a hospital which, in their turn, have a full and true value only when they are based upon sound pathological principles. Only in the light of sound pathological principles, does medicine cease to be a system of empiricism.

That pathology is a difficult subject to study, may be taken for granted, seeing that it has to do with processes of life, and that, not under healthy and natural conditions, but under strange and abnormal conditions, depending partly upon external circumstances, and partly upon processes at work in the economy itself. Disease, we may say, is a condition that is determined by two main factors—the environment, and the life of the body. There is an idea prevalent with many, that pathology is a subject to be studied exclusively in the post-mortem room. This is very far from the truth. Disease knows no existence apart from life. Take away life, and the body is beyond the power of disease. It is therefore a paradox to speak of studying pathology in the dead body. No doubt with the naked eye and with the aid of the microscope, we observe well-defined structural changes to be the effect of disease, and in some cases may be able to trace out the course of disease ; yet we learn very little of the course of disease, or its effects, apart from structural changes. Even pathological anatomy, that deals with these structural changes, is to be studied, not only in the post-mortem room and the laboratory, but in the living body. Structural changes induced by disease, include not merely those changes found in the dead body, but also changes that may occur without causing death. The important changes frequently present in superficial parts and in superficial tissues, in the blood, in the urine, and in other discharges from the body—especially from the lungs and digestive canal—belong strictly to pathological anatomy. The fluid discharges from the body receive, as a general rule, too little consideration, although in many instances they yield most important information for the determination of a scientific diagnosis.

The more we study the structural changes and conditions found at the post-mortem in close association with the symptoms, objective and subjective, of any disease, the better it will be for the science of pathology and the art of medicine and surgery. It is only by this method that we can expect to unravel some of those difficult problems concerning renal disease. It seems very easy to classify chronic renal diseases, and to assign distinct symptoms to distinct forms, but does it not often happen that we find in the post-mortem room one form of diseased kidney, when we have expected to find another form? What is still more important, do we not sometimes at the post-mortem examination meet with renal disease that was not suspected during life? In these really important cases, the question arises, Were there no changes in the urine at all? Or, were these changes of such a kind that only careful and repeated examinations could have detected them? I incline to the opinion (with some reserve, however, for it is founded on small experience) that a more careful analyses of the urines that

come under our examination, according to the more exact methods of later times, would probably show that in this country slight structural changes in the kidney are far from rare; possibly caused by climatic conditions, sudden changes, &c., or perhaps caused by the special habits of the people; and of such causes, excess of animal food in the diet is one of the chief. In this, and in all diseases, one must bear in mind, that surrounding conditions have their influence upon disease, and that diseases, as we find them in this country, may not assume the typical forms familiar to us in our studies in England and Europe, but may acquire special characters; and further, that distinct diseases, some new to us, and some resembling, but not identical with, the diseases with which we confound them, exist and depend upon local conditions.

I do not see how we can enter this field of enquiry with the best chance of discovering the whole truth, unless we study disease as a whole—as it shows itself, not only by its symptoms, but also by its anatomical features. There is a great gain in division of labour, but we should confine ourselves to the study of particular diseases, if such division be necessary, and study these diseases in their entirety—from the appearance of the first symptoms, up to the investigation of the conditions that are found in the body after death, rather than that we should make an arbitrary division of disease into stages, and examine these stages apart from one another. There is no doubt that some men are good observers with the microscope, but atrociously bad observers with the stethoscope, and *vice versâ*. For such men, it is certainly best that they should become specialists with the one or the other instrument, as the case may be. But this is not the rule, and experience tells us that the best clinical observers are not content to pass on to others an examination which they can as well perform themselves. Structural changes, considered apart, may entirely mislead us. No doubt these changes are often definite enough, and in close relationship with the symptoms observed during life. In other cases, structural changes exist without causing any definite associated symptoms; and often enough, symptoms exist without any satisfactory anatomical changes to explain them. Does it not therefore follow that to understand and explain disease, we must study disease, not only in the post-mortem room, but also at the bedside—not only through the structural changes induced by disease, but also through the perversions of function that make up its clinical history? Structural changes can no more teach us the nature and processes of disease than the structure of a nerve, as such, even in its minutest detail, can indicate to us its mode of action. In all the diseases primarily affecting the blood, can we not learn the structural changes most thoroughly when we have the opportunity to examine the blood during life? In one of these diseases—pernicious anæmia, in its

most typical and fatal form—do we not find frequently extreme fatty degeneration of the heart in the post-mortem room; and yet, during life, in spite of this degeneration, the pulse, if rather frequent, has been still regular, and of good strength? How strangely this regular pulse of good tension, contrasts with the waxy pallor and extreme irritable weakness inherent to the disease? In spite of these serious structural changes, the heart is able to maintain a normal circulation. Surely these anomalous conditions, so frequent in the history of disease, are best investigated and explained when the clinical observer is a pathologist, and the pathologist is at the same time a clinical observer. Do we not know, too, of an important class of diseases which we call nervous, that are accompanied by no structural changes that we can definitely assign to any of these diseases? No doubt, with improved methods, we shall find some typical changes in time to come, but we are the more likely to do this if we study these diseases in their continuity. And is not past experience entirely in favour of the view herein expressed, with respect to the study and teaching of pathology?

This is the plan that I have been advocating in my own University. It is in accordance with the plan that obtains in the medical schools of Great Britain, and it is the plan which has led to such brilliant results through the labours of those illustrious men in all countries, who have spent their lives in studying disease. Who are the men to whom we are chiefly indebted for our present more or less accurate knowledge of the pathology of the kidneys and urinary apparatus? Surely Richard Bright, and after him, Grainger Stewart, and Johnson; Bartels and Senator, of Berlin; and Lepine, of Lyons—all of them, without exception, clinical physicians of the first rank. Through whose labours have we become possessed of our present knowledge in the pathology of the nervous system? It was Waller who first gave us the method of tracing out the different systems in the spinal cord and brain. It was Charcot who first observed at the bedside, and recorded the symptoms of certain diseases with unerring judgment and accuracy, and then in the post-mortem room established on a certain basis the relation between the clinical symptoms and certain definite lesions of the brain and spinal cord. Where all had been confusion and darkness, he brought light, and established order. And does not Charcot himself bear witness to the invaluable labours of Hughlings Jackson in the same field; Charcot, Hughlings Jackson, Bastian, Gowers, Bristowe, Kussmaul, Erb—these are the men who have taught us nerve pathology, and they are all eminent clinical observers. May we not ask, too, is not nerve pathology so intimately intertwined with diseases—not only of the nervous system—but with diseases of the heart and of the kidney, and with those important general diseases, syphilis,

rheumatism, gout—that nerve pathology cannot be studied unless we are able to view in a comprehensive manner and from a clinical point of view, the associated disturbances that so frequently present themselves. The same is true in regard to the pathology of other organs. Advance in knowledge has come chiefly through the labours of clinical observers—of Quain, Broadbent, Balfour, and Bamberger, in diseases of the heart; of Wilson Fox, Williams, Green, and many others, in diseases of the lungs; of Jenner, Lauder Brunton, Nothnagel, and others, in diseases of the digestive tract. In every disease, substantial progress in knowledge has come through the labours of those who have studied the disease from its beginning to its end in its various stages, without interruption. That, then, is one of the first principles that I would advocate in the study of pathology. Every physician should, as far as possible, master the pathology of those diseases which he sets his heart to study; and every pathologist should have abundant opportunities to study disease, not only in the post-mortem room, but also in the wards of an hospital. No doubt, as our knowledge increases, new branches develop, and special branches become important enough to form a special study. Such a study is pathological chemistry, which may be said to be a branch of physiological chemistry. In such studies, requiring nothing short of a full knowledge of some of the most complicated chemical methods and laws, specialism is certainly imperative.

Again, there is another important method of investigation which has been pursued by one of Germany's most illustrious sons with such brilliant results. As in physiology, so in pathology, we require something more than physical and chemical tests; we require the test of living processes working in some measure under control; in other words, experimental evidence. John Hunter in England, and Majendie in France, were the pioneers of the experimental method in the investigation of physiological problems; but it was Cohnheim, of Germany, who established the system of experiments upon animals, as one of the recognised methods of pathological inquiry. Every page in the great work of Cohnheim's life, bears witness to the value of this method; yet it should not be forgotten, that Cohnheim was at the same time in active co-operation with two of the most distinguished physicians of Germany—Traube, who first used a thermometer for clinical purposes, and was the first to give a rational explanation of the variable nature of certain clinical signs by means of experiments upon animals made at the inspiration of Cohnheim; and Bartels, who first, by careful daily records, showed that in renal disease, the daily discharge of urine and the degree of dropsy were in an inverse proportion to one another, and in other ways added much to the then knowledge of the pathology of the urinary apparatus.

The triumph of the experimental method in the study of disease (as it was the triumph of Cohnheim's life), was the discovery of the emigration of the white corpuscle in inflammation. The emigration of cells from vessels had indeed been observed nearly fifty years before; but Cohnheim first proved by experiment, that the emigration of the white cells played an all-important *rôle* in the processes of inflammation. This discovery made Cohnheim's reputation in Europe, Cohnheim being then only 28 years of age, and entirely revolutionised the ideas then held with regard to the nature of inflammation. By this same method, too, Cohnheim proved that the various effects of embolism in certain organs, depended essentially upon an especial anatomical feature in the arrangement of the arterial branches, and explained the complete immunity of other organs from infarction in spite of embolism. The later years of Cohnheim's life were largely devoted to the study of tuberculosis. Early in his scientific career, Cohnheim had called attention to the presence of small whitish nodules in the choroid—tubercles in the choroid—but this was an isolated and accidental discovery; his later investigations into the nature of tubercle were made in his laboratory. Being extremely sceptical about Villemin's view, that tuberculosis was the result of a specific infection, he set to work to produce artificial tuberculosis, by inoculating the cornea of rabbits with tubercular material. By this method, he produced typical local tubercular granulations, followed after an interval of some days by disseminated miliary growths in internal organs. Thus, by the experimental method, he convinced himself that Villemin's view was right, and thenceforward, Cohnheim was an ardent advocate of the same view. It was indeed Cohnheim who did so much to prepare the minds of others for the ready reception of Koch's brilliant discovery of the essential cause of tuberculosis. Cohnheim in fact had set the details of his own investigations in such clear order and logical sequence, as to form a chain of evidence that required nothing further to establish the causal relationship of a specific virus and the morbid process. Koch furnished proof, as complete as it was unassailable, that the specific virus was a bacillus, the tubercle baccillus, with which we are all familiar. Years before Koch startled the scientific world of Europe by this masterpiece of his life, Cohnheim wrote:—"The more often I have convinced myself of the exclusive and certain action of genuine tubercular material, the more certain I feel that Villemin's view of the specific nature of the tubercular virus is alone in harmony with facts." But while Cohnheim, as the great exponent of the value of the experimental method, has shed a flood of light upon some of the most difficult paths that we can tread in our pathological inquiries, he has not been alone. A legion of men in other countries, have long since entered the

same field of inquiry, and we know them by their works. Nor should we forget those who, working in the neighbouring field of physiology, have thrown light upon many a difficult problem in pathology. It may be said, that no discovery is made in pathology, that does not sooner or later come to have its application to pathological processes. A few years ago, Flemming published his observations upon the process of cell division. In a series of beautiful specimens, he showed in how complicated a manner this division takes place. Quite recently, this discovery has been of the greatest service to Baumgarten, in his investigations into the nature of the tubercular process in different organs. The common view is, that the presence of tubercle bacilli in tissue sets up a reactive process in the tissues. This reaction consists of the emigration of white cells, that so to speak, form a line to resist invasion by the bacilli. Thus the early tubercular formation is held to be made up essentially of white cells, or granulation cells. Baumgarten, who is one of the first authorities on tubercle, and who, in fact, discovered the tubercle bacillus in lung tissue coincidently with Koch, but was not able to isolate it, combats this view, and supports his own position by very elaborate and beautiful experiments, with artificially-produced tuberculosis. The whole strength of his argument rests upon the process of caryokinesis, observed by Flemming. Baumgarten asserts that, in artificial tuberculosis, the histogenesis is the same for all organs; and that in organs rich in epithelial elements, such as the liver, kidneys, lungs, and the intestinal canal, the epithelial elements participate to a preponderating extent in the formation of genuine tubercle cells, especially in the early stages. By special methods he shows that, shortly after inoculation of the iris, caryokinetic changes—the surest sign of active division in cells—are to be seen in the fixed connective tissue cells of the inoculated tissue, and also in the endothelial and connective tissue elements of the vessel walls. The essential epithelioid cells of the tubercular formation are formed by caryokinesis of these fixed cells. If white cells are present, they show no signs of caryokinesis. Any changes in them are merely degenerative. The important element of the morbid growth is the epithelioid cell of this parentage, which is never branched, but proliferates to form fresh cells of a like kind. These cells, as they multiply at the centre, press upon the peripheral parts, and may sometimes thus destroy the bacilli. It is only at a later stage that leucocytes appear, in consequence of inflammatory action induced in the vessels by the presence of this new formation. Since the leucocytes never show any caryokinetic changes at any stage of the process, it seems clear, that they do not actively participate in the essential process. Indeed, Baumgarten states that, as soon as leucocytes appear, the essential process of caryokinesis is

arrested. In organs rich in epithelial structures, such as the kidneys, the liver, &c., caryokinetic changes are seen to affect, not only the fixed connective tissue cells and the endothelial cells of the capillaries, but in a striking way, even the epithelial elements that constitute the specific tissue of these various organs. Thus the dominant process of caryokinesis affects the specific cells, and with these caryokinetic changes the formation of the essential epithelioid cells of tubercle everywhere takes place.

In the light of these important observations, how radical must be the change in our views respecting the structure and origin of a tubercular formation, if indeed the tubercular process in human beings is similar to the process thus observed in animals. According to Baumgarten's view, the new endothelioid and epithelioid elements in a tubercular formation are not derived from leucocytes at all, but from the fixed connective tissue cells of the tissue—and what are they but the endothelial cells of the lymph spaces—from the endothelial cells of the blood-vessels and lymphatics, and from the specific epithelial cells of glandular organs. This view, that is in entire opposition to the latest views upon the structure of a tubercular formation, is certainly well in accord with the law of heredity, that reigns in tissue elements as elsewhere. It almost seems that we are hastening back to the old view consistently held by Virchow, Ranvier and Stricker, that the fixed connective tissue cells are no passive participators in pathological processes. And let us hope, that this discovery of Flemming will in like manner throw a new light upon the extraordinary and anomalous process of cell division that obtains in malignant neoplasms, and help us to better understand their nature and origin.

Again, we cannot forget the prolific seeds that have fallen upon the field of pathology from another quarter, and yielded a wonderful harvest of results in the elucidation of some of the most difficult and important problems in the whole range of science. Now-a-days, every pathologist must know something of the nature and life history of those lowly organisms, whose place in the multifarious world of living creatures has been assigned only conditionally and after much hesitation. Foremost among the men who have worked in this field of science, and won such glory to themselves, are M. Louis Pasteur and Dr. Robert Koch. We are all familiar with the marvellous influence exerted by M. Pasteur's discoveries in settling some of the most difficult problems in pathology, especially those concerning the causation of specific diseases. These are indeed fitting occasions for making a grateful reference to those great lights in the path of science—those men who, like M. Pasteur, by their loyal devotion to the cause of science, by their steady perseverance in spite of disappointment, in spite

of actual discouragement, have done such noble work in quickening industrial life and stimulating its activity, and in promoting, besides the wealth, the health and happiness of nations. Too often the grand and useful achievements of these great men who have devoted—aye, and in many cases sacrificed—their life, their all, to the cause of science, are forgotten. Science, through her votaries, does her beneficent work quietly, unostentatiously, in the laboratory, in the study, never in the market place, and the incalculable benefits she showers upon nations are the wonder of a day. Pasteur is one of those citizens of the world to whom all gladly pay honour. He is no ordinary man, he is a genius, inspired with a desire and power to discover new things, and apply his great discoveries to the service of mankind. By a sort of inspiration, Pasteur explained the nature of fermentation on the sure basis of experimental evidence, and from these investigations was led into new and interesting fields of scientific inquiry. Step by step the horizon opened before him, till his inquiries into the nature of fermentation, and of certain infectious diseases, heralded the dawn of a new era in science—a new era in the study of medicine. All honour to M. Pasteur for his epoch-making discoveries. Yet, let us not forget that more than two hundred years ago, in that wonderful little country, Holland (which was then in advance of the rest of Europe in literature, science, and art), Leeuwenhooek invented the microscope, and discovered and figured, with his own hand, those different varieties of microbes about which we hear so much now-a-days.

By means of Koch's famous method of cultivation on solid media, it is a comparatively easy matter to separate one species of micro-organism from another, and thus to obtain pure cultivations. Then, a further study of these bodies in a perfectly pure state by different experiments, assigns to each one of them definite characters. But are the characters and appearance of organisms so constant as to justify any scientific classification ; or, on the other hand, is it true that one form of micro-organism can be produced at will from another form, by merely altering external conditions? If, indeed, a micrococcus can be converted into a bacillus, and *vice versâ*, then there is no reason why function should not become modified with change of form ; no reason why a virulent organism should not become innocuous, and an innocuous organism acquire virulence. But here it is right to draw a distinction. It is a well-known fact, that loss of virulence takes place under certain conditions. Any condition that prejudices the life of the organism, must prejudice its function. Thus, injury by physical or chemical, or even physiological, means, is found to weaken the virulence of the anthrax bacillus. Pasteur's attenuated virus is obtained by moderate heat. Chemical agents, notably carbolic acid, bichromate of potash and weak

sulphuric acid, diminish the virulence in the same way. Further, there is sometimes a curious physiological antagonism between different forms of organisms. Curiously enough, the virulence of the anthrax bacillus may be diminished, and even destroyed, by the action of the cocci of erysipelas; and, stranger still, even by the action of a colour-producing organism—the bacillus prodigiosus. These alterations of function, however, are in no sense capricious. They are constant, and become themselves definite characters belonging to the species. A gain in virulence, under artificial conditions, is of comparatively rare occurrence. Pasteur claims to have worked up the virulence of the anthrax bacillus by passing the virus through young guinea pigs of different ages in an ascending series, and certainly a few drops of lactic acid are found to have the effect of greatly increasing the virulence of an attenuated virus of symptomatic anthrax. In both cases, however, it is only that a virus already weakened, becomes again strong. Upon the results of these investigations, rests the whole question whether we have any right to relegate species and varieties to definite groups on account of peculiarities of shape, the mode of growth and multiplication, and other physiological features. Are the physiological and morphological characters always the same for the same variety under ordinary conditions, or are form and function so variable under altered conditions that all attempts at classification are hopeless? Buchner at one time protested that he had, in a definite experiment, converted the virulent bacillus of anthrax into the harmless bacillus that grows so readily in hay infusion. He now admits that the conclusion was based upon faulty observation, and was essentially false. But there are other experimenters, notably Zopf, who claim to have converted micrococci into bacilli, and *vice versâ*; but the observations of Zopf have not been corroborated by any of those investigators who, on account of their special training and experience in the extremely delicate methods of investigation, have the first claim upon our credence. In this science, as in every science, there is need for special training and long experience, before trustworthy results can be obtained. Even if the observations be not faulty, errors in experiment may very easily creep in. The mere observation of round forms among bacilli, is no proof that a bacillus has been converted into a micrococcus. The round form may be assumed by the bacillus at a certain stage in its existence, when spore-formation is the rule, but this round form is no micrococcus, but has the power of again becoming a bacillus.

Again, alterations of form may be due to degeneration. Like other forms of life, these micro-organisms may become diseased; unhealthy in appearance and action. Some practice too is required in the use of the staining reagents, else misleading observations may be recorded.

But the most frequent source of error is want of due precaution in excluding all possible risk of contamination by foreign material. But while perhaps we may argue that, as yet, transmutability of species has not been observed to occur under artificial conditions, we have no right to assume that it does not occur under any circumstances. We cannot assume that these lowly organisms have laws of their own, unlike the laws that govern the rest of the living world. We must assume that variability of form, such as we know to occur in the life of plants and animals, occurs also in the life history of these lowly organisms. Therefore, on the ground of analogy, it is likely that species may be changed, and function modified. In the plant world, especially under the influence of cultivation, there is no limit to variation; but often this variation so far from introducing characters belonging to a new species, becomes itself a sure sign of the species itself. Confusion and difficulty, however, may arise if any phase in the complete cycle of events in the life of the organism, plant, or animal, be overlooked. Thus, the discovery of spores in the life of the anthrax bacillus—a distinct phase in itself—and the dis-association of this phase from the phases of life that precede and follow it, may give rise to the erroneous view, that a bacillus may be changed into a micrococcus. This modification of form is essentially bound up with the nature of the organism, is one of its leading characters, and always appears when conditions are favourable. For the identification of a new species, new attributes must be found, which are not only constant, but are also transmissible to later generations. Changes of form or function that depend entirely on external circumstances, appearing with these circumstances and disappearing with their removal, are not attributes at all. Attributes primarily depend, not upon the external conditions, but upon the inherent nature of the organism. Hence, no new species can be the result of capricious modification or degeneration. While then external conditions may induce changes, these changes are regular and not capricious, and remain only so long as the external conditions persist. Such variations become characters of the species, and in spite of them, it is possible to classify with precision the different forms of organisms. We are thus driven to the conclusion, that it has not been shown by any trustworthy experiment, that there is any great variability of form in these lowly organisms. Indeed, every careful bacteriologist is surprised at the constancy of form and function that obtains in these organisms.

Of all the interesting questions that have been simplified, and to some extent explained, by bacteriological research, none occupies so conspicuous a position as the question of immunity. It is an extraordinary fact, first proved by Jenner, that an attack of a mild or modified form

of a specific disease, may protect against a virulent form of the disease. It is the purpose of vaccination to confer this immunity.

I feel that, in the public interest, I should make more than a passing reference to this important question of immunity by vaccination. Ever since M. Pasteur entered the field in the interests of the pastoralists of Australia, the subject of bacterial disease has occupied a prominent place in the public mind, and one special phase of it—immunity by vaccination—has attracted special notice since M. Pasteur's own delegates performed their famous experiment at Junee. The demonstration at Junee was an event of no little importance to the public, seeing that a Minister of the Crown took part in the rejoicings, and every colony sent its most skilled veterinarians to form their own judgments, probably with a view to advising their respective Governments on this question of vaccination in Cumberland disease. This, at least, I can say, that steps are now being taken by the responsible authorities in New South Wales for the introduction of Pasteur's scheme, and this action is in the main the outcome of the demonstration witnessed at Junee. I maintain that, at the present time, with our extremely imperfect statistics, any such action would be precipitate and unwise. Competent authorities in England are far from satisfied with Pasteur's method. In Germany the method is not approved, although anthrax is common in certain parts of Prussia. In Italy the principle, and not Pasteur's application of it, has found some favour; but it is applied, not to save sheep, but to save cattle. In Hungary, too, Pasteur's method has been used though with some important modifications. But in all these countries, there are trustworthy statistics to show the serious proportions assumed by outbreaks of the disease among animals, and the localities of such outbreaks. In New South Wales, we have no positive trustworthy evidence that anthrax is the cause of a high rate of mortality among either sheep or cattle. What evidence we have is of a most meagre kind, and we do not yet know but that, as proved to be the case in Germany after scientific investigation, some of the outbreaks might prove not to be outbreaks of anthrax at all. At any rate, one is justified in demanding that, before Pasteur's scheme be introduced for a trial, the Government should be assured on none but the most scientific evidence, that anthrax exists in dangerous proportions, causing a high rate of mortality among animals; that the high rate of mortality is due to anthrax, and to nothing else; that the outbreaks are confined to certain localities, and there cause an alarming number of deaths. These conditions are indispensable for the useful application of Pasteur's method. Again, we should know on authority, independent of M. Pasteur, that this scheme is not only useful, but also free from danger, or else we run the risk of increasing the evil, instead of

remedying it. Finally, and most important of all, it has to be shown that Pasteur's method is the only and best method by which we can successfully attempt to limit the extent of this disastrous disease.

It is of the first importance that, in forming a judgment on this matter, we should be careful to exclude all statements and records of experiments that are not satisfactory or trustworthy. Many sanguine observers have either overlooked fatalities, or attributed them to carelessness or accident. False conclusions, too, have been based upon insufficient premises. Thus it does not by any means follow that a fall in the rate of mortality in a district, after the use of vaccination, is due to the use of vaccination. It is well known, that the rate of mortality may be high in one year and low in the next, even when no vaccinations have been performed. It would be manifestly illogical to contrast the results of vaccination during a year of low mortality, with the results of the disease in a year when the mortality was high. This method of reasoning has been used by the advocates of Pasteur's method, and not only stands self-condemned, but creates a strong prejudice against the system of vaccination altogether, as a method of checking anthrax. There are, fortunately, investigations and actual practical results obtained in Europe by the application of Pasteur's method which are open to no such objection, and are well worthy of close attention.

Such demonstrations as that given at Junee are of little assistance to us in considering the question, for it has long been established as a scientific fact beyond dispute, that if sheep be inoculated with an attenuated virus of anthrax, they are protected not absolutely, but to a very marked degree, against the virulent and fatal disease. We may take it for granted that, in the hands of Pasteur's own pupils, the demonstration was made in a manner that would be as satisfactory to scientific men, as it was to the members of the board of inquiry. Yet the result of the demonstration might have been anticipated by anyone competent to form an opinion. In fact, the demonstration found us where it left us, and added nothing to the knowledge of facts upon which the advantages and disadvantages of Pasteur's system rests.

I intend to enter somewhat fully into the real merits of this important public question, because although such a demonstration helps us not at all to appreciate the merits and demerits of Pasteur's system, there are some persons who are eager to introduce the system on the strength of this demonstration. Fortunately for us, the numerous experiments and practical trials that have been made to test the real value of this method, have been so fully recorded, that we are in a favourable position to criticise the claims and assertions of the advocates of Pasteur's scheme. It is solely upon the basis of these recorded results that we

must consider how far M. Pasteur is right in advocating the practice of vaccination, to prevent the disease commonly known as anthrax, or Cumberland disease. Although to Pasteur alone belongs the honour of having explained the *raison d'être* of immunity after vaccination, and of being the first to prepare a vaccine of known and constant strength, the idea of vaccinating animals to protect them against virulent anthrax certainly originated with Toussaint. It may be stated as an axiom, that the value of a vaccine depends on its power to secure immunity, without endangering the life of the animal vaccinated, or of other animals. Pasteur, after making extensive experiments in his laboratory, asserted that he had succeeded in preparing two vaccines of different strengths and both attenuated, which, if inoculated according to his plan—the weaker one first, and the other a fortnight later—secured immunity in sheep and cattle against anthrax. These vaccines are prepared by no secret method, and may be prepared in different ways. Pasteur prepares his weaker vaccine, vaccine No. 1, by maintaining cultivations of the bacilli in sterilised chicken broth at a temperature of 43° to 42° C. for twenty-four days; and the stronger vaccine in the same way after twelve, instead of twenty-four, days' cultivation. It was a remarkable enough discovery, that heat thus diminished the virulence of the organism; but more remarkable and more important still was the discovery that, when once the virulence had been reduced, the bacilli might be exposed to a lower temperature, say 35° C., highly favourable for their growth, and readily allowing spore-formation to take place, without any risk of the bacilli regaining their lost virulence under these new conditions. The degree of virulence established by artificial cultivations, remained constant. This discovery is the basis of protective inoculation. Pasteur's plan of operation was so clear, and the discovery so important, that it was only to be expected that workers in the same field of inquiry would investigate and thoroughly check his method and results Nothing could be fairer or more pregnant with sound practical wisdom, than the criticism of Koch, of Berlin, who alone at that time had an undoubted right, by virtue of his own investigations, to review the work of Pasteur. In the first place, Koch proved that immunity under artificial conditions of inoculation did not guarantee immunity under natural conditions. Animals may resist anthrax by inoculation, and yet not resist invasion by the germs, especially in the lasting form of spores, when they have entered the stomach. Experience, too, has shown that cattle, which are but little susceptible to anthrax by inoculation, die in a startling manner when the food containing these malignant spores of anthrax is of a kind to injure mechanically the mucous membrane of the digestive tract. Koch showed also that of

seven sheep that had resisted infection by inoculation with virulent anthrax, two subsequently succumbed when food containing the bacilli found entrance to the digestive canal. Hence, there could be no doubt that immunity under artificial conditions is no guarantee of immunity under natural conditions. Koch further showed that Pasteur's vaccines, prepared by his own hand, were not of constant strength. Sometimes they were too strong, sometimes too weak, and this variable strength was proved to be due to the slight degrees of variation of temperature that occur in the best regulated machines. At the same time, Koch suggests his own simple method of obtaining two vaccines resembling Pasteur's vaccines in everything but this tendency to vary in strength. He found that Pasteur's weaker vaccine is strong enough to kill mice, but not guinea-pigs or rabbits; while Pasteur's second vaccine is strong enough to kill mice and guinea-pigs, but not rabbits. Therefore, Koch says:—"The cultivations that are strong enough to kill mice, but not guinea-pigs, are to be used as vaccine No. 1; and the cultivations that are strong enough to kill both mice and guinea-pigs, and yet spare rabbits, are of the proper strength for vaccine No. 2." In this way, proper vaccines can be obtained and checked.

Apart from such laboratory experiments, we have numerous carefully recorded results of practical trials that help us in some measure to judge of the wisdom of Pasteur's scheme. In these practical trials, the object has been to determine how far the method is successful in securing immunity, and its freedom from danger. The records of experiments made in France and Italy show that out of 116 sheep thought to be protected by Pasteur's method, no less than thirty-five succumbed through virulent infection produced by inoculation. In Russia, of sixty-two sheep similarly inoculated, only fifty proved to be absolutely protected. Kitt gives us some valuable records. He obtained vaccines from Pasteur's own agent, and by the usual tests proved them to be pure cultivations of anthrax bacilli, containing spores and threads. After inoculating, in strict accordance with Pasteur's plan, four sheep, one lamb, and two bullocks, the two bullocks and only one sheep survived subsequent inoculation with virulent material. Kitt concluded that the vaccines were probably too weak, and that the bullocks had not been protected, but had survived the genuine unmitigated disease. Thus it would appear, that complete immunity is not easily secured, unless a virus is used of such strength as to cause severe symptoms, or, may be, endanger the life of the animal. As a rule, the first vaccination is free from danger, but the second inoculation has caused death in as many as ten to fifteen per cent. of the animals. When there is the risk of such a high percentage of deaths, it cannot be said that the preventive inoculation has any

particular advantage. No doubt these high percentages of deaths are not the rule, but where there is no risk in the inoculations, there is no great protection secured. To emphasise the risk of protective inoculation, it may be well to quote some statistics. In Kapuvar, of fifty sheep, five died after inoculation with vaccine No. 2; in Packisch, three out of twenty-five; in Salzduhlun, three out of eighty-two; in Dlonie, twenty-six out of 703; in Urmenyi, twelve out of seventy-seven—in all, forty-three deaths out of 937 animals inoculated; in other words, four and a half per cent. of deaths. But the most remarkable statistics are those furnished by Koch of results obtained in Montpothier. Of 220 wethers, nine animals died after inoculation with vaccine No. 1; later, seven more died after a repetition of the same vaccine; and later still, another animal after the use of vaccine No. 2—that is, seventeen in all out of 220 animals. This ought to have been a sufficiently severe inoculation to ensure immunity. Yet a short time after, six more animals died of natural infection. A further inoculation was made with vaccine No. 2, and five more wethers succumbed. As Koch exclaims, "At what a terrible cost was immunity secured in these cases." To give one more striking record of results obtained upon a small sheep farm. For some years, a farmer had lost from three to ten per cent. of his sheep annually from anthrax. He divided his sheep into two flocks of about 1800 each; one flock he did not inoculate, the other flock of 1800 he inoculated by Pasteur's method. Of these, twenty-one died as the result of inoculation, and later, six by natural infection—that is, twenty-seven in all. Of the uninoculated sheep, fifty-six died of natural infection. Let us suppose the cost of inoculation to be 3d. per head, the cost of inoculating 1800 at this rate would be £22 10s. It thus costs £22 10s. a year to save about thirty sheep. This can scarcely be said to be any great pecuniary gain.

But Pasteur says that it is not necessary to use such a powerful virus as will cause this great percentage of deaths, because the danger from natural infection is less than by inoculation, and therefore, a weaker virus is sufficient to protect against natural infection. In the face of this statement, Koch has clearly proved the reverse to be the case. Under natural conditions, infection is conveyed by the spores of anthrax bacilli that are taken with the food into the stomach; and this mode of infection is more powerful, more dangerous, and more fatal than infection caused by inoculation. This is admittedly the case in cattle; and of seven sheep which, after proper vaccination, had resisted infection by inoculation with virulent material, two of the animals died when they were fed with food containing anthrax spores. In sheep therefore, also, this fact is quite at variance with Pasteur's view.

It must also be remembered, that any protection secured lasts at most only one year. Thus, with respect to Pasteur's scheme, as it applies to sheep, we find that the method of inoculation, to be effective, is certainly dangerous, in some cases causing the death of five to ten per cent. of the animals subjected to the treatment. The material, even when it is supplied directly from Pasteur's own hands, varies in strength. If it be weak, although it may not kill the animals, it may affect their strength without protecting them. If it does not affect them distinctly, it does not afford protection. In the most favourable cases, protection lasts only for a limited time. The method, too, must be costly. There is not only the original cost, but the method, if applied at all, should only be applied in districts where the disease assumes dangerous proportions, and then only under special regulations, else the disease may be encouraged by the introduction of the method. All the cost of such special regulations must also be taken into consideration. On the other hand, it has been shown by practical results in other countries that the disease among sheep can be greatly checked, and its spread prevented, by the introduction of special sanitary regulations in the infected districts. These sound sanitary regulations, consisting in the main of the immediate notification of outbreaks when they occur, and the prompt and thorough destruction by fire of all the carcases of animals dying from the disease, have every year produced better and better results; and for the present—at least, until we have some accurate scientific records upon which to base further steps, we should do better to confine our action to the introduction of such strict sanitary regulations in our efforts to limit the extent of the disease, and perhaps banish it altogether from districts where it now prevails, rather than hastily introduce a system, the wisdom of which is, at any rate, disputed by those most competent to form an opinion.

With respect to cattle, it would seem that Pasteur's method is less dangerous, and naturally less costly, than in the case of sheep, and the general conclusions with regard to its advantages are of a more hopeful kind. The primary vaccination is not very dangerous, because in the majority of cases cattle, even when subjected to inoculation with virulent anthrax, suffer only from severe local reaction. For cattle, the vaccines used and recommended by Pasteur, are much too weak to give any protection. This is proved by the fact that, in those countries where the method is applied to cattle, the vaccines in use are stronger than Pasteur's—some of them, notably that of Perroncito, being little weaker than virulent anthrax. Even these vaccines, while they afford protection for a time against infection by further inoculation, do not guarantee absolute immunity against infection by natural means, and they may be a source of danger, not only to the animals themselves,

but to other animals, especially sheep. We are, in fact, asked to use a material which, while it may protect cattle to some extent, is highly dangerous to sheep. It is strange that, although Pasteur's method is stated to be more suitable to protect cattle than sheep against anthrax, and although the mortality among cattle is much greater and more serious than among sheep, Pasteur has applied his method to protect sheep rather than cattle. Taking the statistics of Prussia, Austria and Hungary, I find that 1113 out of 6 millions of horses, 1380 out of 27 millions of sheep, and nearly 8000 out of 23 millions of cattle, died in one year from anthrax. Yet all the records of Pasteur show that his system is specially advocated, and is mainly applied to save the lives of sheep. It is mainly in Italy and Hungary that extensive inoculations have been made to protect cattle from the disease.

What, then, are the general conclusions with regard to Pasteur's own method of vaccination to protect cattle from anthrax? Firstly, his vaccine is not the best vaccine for the purpose, even when large doses are given. Next, successful vaccination does not secure immunity against infection by natural means. After such vaccination, five to ten per cent. may fall victims to the disease, probably by the entrance of spores into the stomach with food material. Further, a vaccine strong enough to protect, may be a serious source of danger to sheep, and is dangerous even to cattle. If any such animal dies, its carcase swarms with organisms virulent enough to cause a wholesale destruction of sheep. It therefore follows, that all animals that have been vaccinated must be under strict supervision until the period of such risk is passed. The effect of vaccination is generally to arrest the secretion of milk. Any milk secreted is unfit for use, and even dangerous. This effect, too, has a commercial disadvantage. It goes without saying, that the flesh of no vaccinated animal is fit for food, till a certain interval of time has elapsed after vaccination. And if the animal should die during this interval from accident or other cause, apart from the specific disease, it should be condemned as unfit for food, and destroyed by fire. Thus, even if no other objections to the system existed, it is evident that, with its introduction, it would be necessary to introduce most stringent regulations, obedience to which could only be enforced by a staff of competent officers. Thus one can imagine how expensive the method would become, quite apart from the mere cost of preparation and supply of the vaccine. The question then becomes an economic one. What is the gain, if the method of protective inoculation, with the attendant conditions, is so expensive as to counterbalance or, perhaps, even outweigh the advantage gained by inoculation? Since the real nature of the disease has been understood, regulations have been framed to minimise the danger of infection—and with good results

—these regulations have reduced the number of cases of the disease in those countries where they have been strictly administered, and sufficient time has not yet elapsed for us to be able to gauge the full value of these regulations. At any rate, until these simple methods have been fully tested and found wanting, I can see no good grounds for introducing a system which must always have an element of danger. Quite lately we have learned that, by an accident, 3000 sheep were sacrificed to this method.

These are the conclusions to which an impartial review of the whole question forces us. Let our Governments—and it is a matter affecting all the colonies—first take steps to find out the real extent of the disease. This could only be done by appointing an inspector possessing the necessary scientific knowledge to visit the districts in which the disease is said to prevail, and then to report. It is only in this way that any satisfactory information and statistics could be obtained. Owners of stations are not anxious to proclaim to the world that their sheep or cattle are dying of Cumberland disease.

One is a little apt to discredit the view, that Cumberland disease is causing a high rate of mortality among sheep. In New South Wales, we have almost as many sheep as they have in the whole of Russia, the great sheep farming country of Europe, and if the disease was very common, one would expect to hear more of woolsorters' disease among men, and more of the disease in cattle. In Europe, the mortality among cattle is far greater than the mortality among sheep, both absolutely and relatively. Until we have real and trustworthy statistics of the extent of the disease, the Government should introduce proper sanitary regulations that can be carried out by stock-owners, rather than in a haphazard fashion and on no reasonable grounds, encourage the introduction of Pasteur's system of vaccination for the prevention of Cumberland disease in sheep.

But it must strike one with surprise that, in a country like Australia, the prosperity of which is, to a large extent, bound up with the great national industry—sheep and cattle farming—no effort is made to establish scientific institutions for the investigation of the diseases of animals. How long are we to depend entirely on the results of work carried on in Europe? Surely we have here abundant opportunities to contribute to those scientific investigations, which must be of enormous practical value to our special industry. It is high time that such an institution should be established for these investigations, therefore it was that I wrote to the Minister for Lands:—"It seems to me that some encouragement should be given in this colony to scientific investigations that aim at discovering the essential cause of disease, not in man only, but also in animals, with a view to checking, and

possibly eradicating, such disease. Such encouragement is given pre-eminently in Germany, and Koch's splendid work flows from it. France vies with Germany, and England is following the example. There should be a bacteriological institution in connection with the stock department, or at the University, or in connection with the Board of Health, as I urged three years ago." If such an institution existed, it would be of enormous value to our great industry, for upon any outbreak of disease in stock, scientific investigations would rapidly settle the nature of the disease, and this is the first step towards checking and eradicating the disease. Such an institution is ready at hand in Sydney, if only the Government will see fit to establish it. A set of buildings, fitted up with all the necessary appliances for bacteriological research, has been erected in order to test Pasteur's method for the extermination of rabbits. The Government will do a great and useful work in encouraging scientific research, and in assisting our great national industry by establishing, on a permanent basis, the present institution under the control of the Rabbit Commission, as a scientific institution for the investigation of diseases of animals.

I trust that I have given no offence in alluding at some length to this important practical phase of a highly interesting scientific discovery. It is well for us to learn from the teachings of science our duties and responsibilities in this complex world of men and things. I am glad, too, to have had the opportunity of expressing the opinion that, in these young colonies, Government should bestow liberal patronage upon scientific investigations that have a great practical value in special industries. Yet history tells us how slow Government may be to recognise its duty. What a pathetic episode is presented us in the answer given by a French Minister of Finance to M. Pasteur, when he sought for some little assistance in his scientific researches—and that but twenty years ago:—"There is no clause in the Budget to grant you £50 to defray the expenses of experiments." This was the discouraging reply. Did this refusal thwart him? Fortunately for France, M. Pasteur followed science as a religion; and, full of faith, full of enthusiasm, he bore himself, poor as he was, the expense of his investigations—those very investigations which were the means of saving from total ruin one of the great industries of France, the means of preventing the loss of many millions a year to the people of France. May we not ask, what statesman, what financier, what general, can point to work so great, so useful? Yet, while these public men receive their decorations, their titles, their rich pensions, the votary to science, who has lavished untold blessings upon the people, who is ever assisting industry, who saves life instead of destroying it, who truly ministers to the health and wealth and happiness of the people, receives scant,

if any, recognition, and his good and great deeds are the wonder of a day. Let us all learn from the example of M. Pasteur, and follow our special studies as a religion. Full of enthusiasm for the brilliant achievements of the past, full of faith in the grand possibilities of the future, let us study the nature and origin of disease, in season and out of season, at all times and in all places, so that some of the boundless possibilities of the future may become the real achievements of our own lives.

THE PATHOLOGY AND CLINICAL SIGNIFICANCE OF AN EXCESS OF INDICAN IN THE URINE.

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Although the cases illustrating this paper occurred at Addenbrooke's Hospital, Cambridge, during the three years 1885–87, whilst I was holding the post of house physician, I thought the subject might be of interest to some members of the Congress. During my term of office, I had to examine about fifteen hundred specimens of urine, and in six of these I found a marked excess of the substance called indican; and as most of these cases came under diseases of the alimentary canal, I concluded there must be some connection between the two; and on searching the authorities on the subject, which are principally to be found in Hoppe-Seyler's "Chemistry," I found that their views generally agreed with my researches.

Very little is to be found in English medical literature on the subject. In Hilton Fagge's "Medicine" there are some remarks on indican, but these appear to be simply an extract from the German edition of Hoppe-Seyler's work. M'Munn, the author of the work on the "Spectroscope in Medicine," has made a study of indican for years, and to him I am indebted for much valuable information as to German authorities.

The history of indican began with Schunk of Manchester, who discovered it in the urine as a normal constituent, and it was at first supposed that this product was identical with the indican found in the vegetable kingdom; but this has since been disproved, although they differ in only a slight degree.

The presence of indican can be demonstrated by adding hydrochloric acid to a large quantity of urine placed in a long glass vessel, and then allowing the mixture to stand for about twenty-four hours, when a dark bluish scum of indican appears on the surface of the urine.

A second method of determining its presence is, by adding hydrochloric acid and chloride of lime to the urine, and then shaking the mixture with chloroform, which becomes bluish from the presence of indican; and on being examined with the spectroscope, shows the characteristic bands.

A third way for detecting indican in excess, and which is a very useful one for clinical demonstration, simply requires the urine to be warmed, and then nitric acid, yellow with nitrous, to be added; when, if the indican be present in any quantity above the normal, a dark-brown colouration appears, which goes quite black on the further addition of the acid.

The physiological causation of indican in the urine has been principally worked out by Jaffé, whose investigations are to be found in Hoppe-Seyler's "Chemistry," as previously quoted.

It has been proved experimentally, that the final reduction of indigo is a substance called indol. Now it has long been known that, during the artificial pancreatic digestion of proteid material, two bodies, with an offensive odour, to which the peculiar smell of fæces is due, are formed—one being the body indol, the other a closely allied body skatol; and there is not the least doubt that the same two bodies make their appearance in the small intestine of man, in exactly the same way as they appear in the physiologist's laboratory.

The presence of indol and skatol does not appear to be due to the action of the tryptic ferment of the pancreas, as at first supposed, but rather due to a simultaneous putrefactive change taking place, under the influence of bacteria. For if the laboratory digestion be conducted with strict antiseptic precautions, with the presence of salicylic acid, no putrefaction occurs, no indol appears, and the products of digestion have no characteristic smell of fæces. This of course might be due, though very unlikely, to the destructive action on the ferment which produced the bodies indol and skatol.

It is well known that bacteria are present, in the alimentary canal, from end to end, in great quantities in the small intestine, but increasing in number towards the rectum. These would easily account for the presence of the indol and skatol in the small intestine of man, where the pancreatic digestion of proteid material is proceeding rapidly; and when from any cause there is some alteration in the amount of absorption from, or the onward movement of, the intestinal contents, or change in the mucous lining of the canal, the excess of the body indican, which in certain cases is found in the urine, has a ready explanation. It has been proved by Jaffé that, by feeding dogs on indol, obtained by the pancreatic digestion of proteids, or by injecting the same substance under their skin, a large excess of indican could be made to appear in the urine. Again, by simply feeding dogs on an excess of proteid food, in which it is supposed that much indol would be formed during the pancreative digestion in the alimentary canal, a large quantity of indican can be discovered coming away in their urine. Indol being the final reduction product of indigo, it can be easily imagined, that after its absorption from the intestine, and during its sojourn in the blood, and its passing out by the urine, it can become oxidized into the product, indican. No indican has ever been found in the blood, but it has easily been detected in the renal epithelium, from

which it has been concluded, that the final transformation takes place during the very act of excretion, as is well known occurs with other excretion products which are got rid of by the kidney.

Jaffé has found indican in excess in the urine, clinically in cases of intestinal obstruction, and by experimentally obstructing the intestine of dogs, especially the small intestines, he obtained indican in excess in their urine, thus proving that any obstruction to the onward flow of the contents of the bowel, leads to an increase of the indican-forming substances in the blood; but it appears, from both clinical facts and experimental investigation, that obstruction in the large bowel does not produce the same excess of indican in the urine. This might be either due to further changes having taken place in the contents of the bowels in their onward progress along the canal, so that no longer any indol is formed; or else, from the peculiar construction of the large bowel, absorption of indol is rendered difficult. For if the change be simply a putrefactive action, there is no reason why plenty of indol should not be formed, as the large intestine contains many more organisms of putrefaction than any other part of the canal.

But it has been shown, that the indol is formed during the digestion of the proteid food; and as this is mostly complete, and the products absorbed before arriving at the great intestine, which only absorbs the watery constituents of the contents, rendering the fæces drier, a ready explanation is obtained. Obstruction of the bowel does not appear to be the only cause of the presence of indican in excess in the urine, as Senator (vide Fagge's "Medicine," Vol. II.) refers it to states of inanition, as cancer of the stomach, gastric ulcer, and phthisis with diarrhœa. Herringe, also quoted by the same authority, insists on its appearance in wasting affections of the canal, as well as its presence in cases of diarrhœa and constipation; but with regard to the latter, I shall have more to say after quoting the cases which have come under my own immediate notice. I propose now to give a very short account of the clinical cases which I have had the opportunity of personally examining.

The first case occurred in Addenbrooke's Hospital in October 1885, and happened as follows:—Elizabeth T., æt. 31, admitted from the out-patients', with very obscure symptoms. There was a history of loss of flesh, slight diarrhœa, with pain and tenderness in the left lumbar and iliac regions of the abdomen, with a slight sensation of resistance, but no evident tumour. Her temperature was found to rise each night to 103° or 104° Fah., and fall in the morning. The patient rapidly ran down hill, no diagnosis being made, but an abscess connected with either the spleen or kidney thought of. Her urine from the first had a peculiar dark colour, resembling urine in cases of carboluria, and this colouration increased on standing for some hours. On heating a specimen, and then adding nitric acid, yellow with nitrous, it became absolutely black, but at the time no importance was attached to this fact. Dr. F. T. Allen, of the Cambridge Physiological Laboratory, examined it for me, and was able to separate large quantities of indican, and confirm my previous supposition that the colour produced by the nitric acid was this body—indican. The patient soon died, and the post-mortem showed well-marked tubercular ulceration of the bowel.

The second case was that of a man with a probable malignant ulcer of the pylorus, with sickness and constipation; but as the patient left

the hospital somewhat improved in health, we never had an opportunity of verifying our diagnosis.

The third case was that of a man, aged 66, who was admitted with all the symptoms of acute intestinal obstruction coming on after a large meal, in which a considerable amount of cucumber had been eaten. The patient became so ill, that an operation was suggested; but he would not consent to this, and perhaps for him a good thing, as in a few days all symptoms disappeared under copious enemata. During the whole period of his acute obstruction, a great excess of indican was present in his urine.

The fourth case was that of a drunkard who had no evidences of intestinal obstruction, but had two epileptic fits after a big bout of drinking, during which time his urine contained indican in great excess.

The fifth case was that of a woman, aged 29, who was admitted with acute intestinal obstruction, which came on after a violent exertion. An operation was proposed, but declined by the patient. The urine was always black with indican. The post-mortem showed a twisting of the bowel, with an ulcer about eighteen inches above the ileo-cæcal valve, in the small intestine, with a recent perforation of the bowel into the peritoneal cavity.

The sixth case was that of a nurse who suffered from great abdominal pain, accompanied by stools which only contained blood and slime; no motion. During the whole time of passing the blood and slime, indican in great excess was present in the urine.

Since being in the colonies, I had an opportunity of seeing an interesting case under Dr. Stirling, in the Adelaide Hospital, who kindly allows me to make use of it. A young, strong, healthy man was admitted with a crushed abdomen, and symptoms of obstruction of the bowels. As he had a rupture, this was operated on, but without finding any strangulation, and was returned after removing much omentum. As the symptoms continued, it was suggested that abdominal section should be performed, with a view to finding if any internal seat could be discovered. This was not carried out, owing to the critical condition of the patient. I carefully examined his urine, and could find no excess of indican, and from this concluded that no obstruction existed, but only peritonitis, and this proved to be the case post-mortem, when peritonitis was discovered, due to a rupture of the bowel from the crush. Although this does not come under the head of Indicanuria, it well illustrates its usefulness from a diagnostic point of view.

In viewing the above cases, it will be seen that all but one, namely, the drunkard with fits, had some intestinal trouble, thus closely corroborating the previous observations of Jaffé, Senator and Herringe.

I have also noticed an excess of indican in cases of strangulated hernia and prolonged constipation; but, strange to say, I have never, either at home or out here, been able to detect indican in typhoid fever, except in slight traces where there is constipation. This may be explained by the diarrhœa carrying off the intestinal contents before any indol was formed, especially as from their diet, very little would be present.

In submitting this paper to the Congress, I have endeavoured to show that the blackening of the urine, on adding the nitric acid, may be at times of great clinical importance; and if my observations be correct in typhoid and tubercular ulceration, it might help on some occasions to differentiate between obscure cases of these diseases.

UNILATERAL RENAL ATROPHY, WITH CASES.

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From early times quite a number of cases have been collected, where one kidney has been either absent or defective, from disease or congenital abnormality.

Morris in his book on "Surgical Diseases of the Kidney," reviews the literature of the subject. He shows that Morgagni, over a hundred years ago, knew of cases of single kidney, and divided them into two classes, namely:—(1) Fused kidney, where an organ was made up of two; (2) Congenital single kidney, where one only had been formed. Rayer and Rokitansky also studied the subject. The latter limited the term "solitary" kidney to Morgagni's first class—the fused kidney; while he gave the name "unsymmetrical" to the single organ normal in position, when its fellow is deficient. Morris dissents from these somewhat confusing terms, and divides single kidneys into three great classes:—

(1) Unsymmetrical kidneys, *i.e.*, entire absence of one kidney.

(2) Atrophy, including congenital atrophy.

(3) Solitary kidney, *i.e.*, fusion of the two kidneys into one mass. This includes the horseshoe variety.

He then shows that several examples of absence of one kidney have been recorded, and analyses those quoted by Rayer, who collected forty-six cases; of these, seventeen were unsymmetrical, and six were examples of complete unilateral atrophy, due to defective development, or disease. But Rayer's record, though it may show the proportion the various forms of renal defect or atrophy bear to one another, does not give the percentage of cases in which single kidneys may be expected.

Accordingly, Morris analyses the post-mortem records of four of the great London hospitals, and shows forcibly the comparative rarity of this defect. He found only three cases of absence, or extreme atrophy of one kidney, out of 11,978 autopsies, and thus proves that congenital absence of one kidney is a very rare event, occurring once in nearly 4000 cases. He quotes Dr. Weis in the *New York Medical Journal*, who estimates that the single kidney is found about once in 5000 bodies. These figures refer only to the proportion of cases of unsymmetrical kidney, and of extreme congenital atrophy. They do not include the proportion of fused kidneys, nor of those atrophied by disease; nor congenitally small kidneys, which weigh from one ounce to an ounce

and a half. He found that 59 "atrophied" or "small" kidneys were found in 8178 inspections. Morris then deduces the following conclusions:—

(1) The probability of a person having one kidney, owing to congenital absence or non-development of the other, is very small.

(2) There is a larger risk of meeting with one of the forms of fused kidney, and a much greater risk of finding one of the kidneys wasted by disease.

(3) Fused kidneys are usually situated in the median line, and so their position prevents error.

Dr. W. Roberts also analyses the cases of single kidney recorded by Mosler, Rayer, and others, and shows the rarity of the atrophied kidney.

There are two great classes of atrophy of one kidney:—(1) The congenitally atrophied kidney; (2) the kidney atrophied by disease.

The pathologist, finding one kidney very small, or almost absent, may sometimes hardly decide between these two classes, but authors give the following guiding signs:—

Ralfe says, that in congenital cases, the ureter or renal vessels are defective or rudimentary; whereas, in a kidney atrophied by disease, the ureter usually remains, and frequently some trace of the organ itself. In both cases, the other kidney is hypertrophied, and so long as it is sound, does double duty.

Roberts says that, in congenital cases, other defects are usually found either in the genito-urinary organs, as the ureter, bladder, or urethra; or shown in imperfect development of the body generally, as cleft palate, malformation of limbs, &c.

The causes of secondary atrophy, or atrophy due to disease, according to Morris, are numerous, as Bright's disease, which usually affects both organs; obstruction of ureter, hydronephrosis, interstitial nephritis, due to stricture of urethra, or stone in the bladder; embolism, &c. Fagge thinks calculus in kidney or ureter the most likely cause. The three cases I have seen belong, I believe, to the last class, where the kidney is destroyed or atrophied by disease. The rare condition of the congenital atrophied kidney, I have never seen.

I.—Case of Absence of Right Kidney, Left Kidney Hypertrophied.

A man, named T. R., aged about 41, of well-nourished muscular frame, fell from a scaffold, and died next day comatose, from intracranial hæmorrhage.

Autopsy, eighteen hours after death.—Left kidney abnormally large, in usual situation, somewhat of horse-shoe shape, about six inches long; weight, ten ounces. Capsule peeled easily, surface smooth. On section, cortex was half an inch wide, pyramidal portion congested; the organ looked otherwise healthy. A prolonged search revealed the fact that the right kidney was absent. Its place was represented by a small mass of fibrous tissue, embedded in fat, from which ran a ureter, smaller than normal in the upper half, but the lower half of the tube was greatly dilated and sacculated, resembling a portion of small intestine. Close to the bladder was a cyst-like enlargement, the size of a hazel-nut; the vesical opening was impervious. On slitting up this big ureter, it was found to contain a dirty brown oily fluid, which contrasted with the limpid urine which was in the bladder in small quantity.

In this case, I believe the right kidney was destroyed by pressure effects, due to the permanent and irremediable obstacle to the escape of its secretion by way of the ureter. Some ulceration or adhesive inflammation, or a calculus, probably blocked the vesical end of the ureter. The sacculated condition of the duct, points to the long continuance of this cause. Hydronephrosis, and consequent atrophy from pressure, was a likely result.

It is possible too, that the affected organ may have been congenitally small, and so the other kidney of partly horse-shoe shape, by doing double work, gradually assumed its enormous size.

It is improbable, that the right kidney was congenitally absent, for the reasons before given :—

(1) A very definite ureter was present.

(2) No other signs of congenital defect were found.

Fagge quotes a similar case in his work on "Medicine," vol. II., p. 674.

Case II.—Remarkable Atrophied and Cystic Condition of the Right Kidney, Left Hypertrophied.

A stout elderly man named E. M., aged 63, was admitted into hospital on the night of June 8, 1888. He was drunk, but not violent. It was found that some hours previously he had fallen down an embankment, and was brought six miles in a cart. He had a fracture of the right humerus, just above the elbow. On the inner side of the arm, a little above the fracture, was a small punctured wound, which bled freely on removing a pad and bandage, one of the superficial veins being pierced. A lacerated superficial wound, about two inches long, was on the upper and inner side of the right thigh, and abrasions on the right knee. The seventh rib, right side, was fractured in front of the angle.

On June 14th, there was evidence of pulmonary congestion, with noisy delirium, embarrassed respiration, &c. Urine was passed freely.

June 15th. He died, comatose, at 10 a.m.

Autopsy same day—Injuries as above. Slight pleuritic adhesions right side. No wound of pleura or lung. Pulmonary congestion affecting lower half of right lung. No true pneumonia. Lung weighs twenty-eight ounces; slighter congestion at base of left lung, which weighs twenty-four ounces. Heart—much fat on surface; right chambers full of dark semi-clotted blood; left empty. Slight fibroid thickening in ring and cusps of mitral valve. Slight atheroma of aorta. Marked hypertrophy of left ventricle. Liver fatty, weighed eighty-six ounces. Right kidney was embedded in perinephritic fat, and was hard to find. It measured two inches long, by one and a half inches broad, and weighed only three-quarters of an ounce. On its surface were three cysts, which lay near the convex border, and contained clear fluid. The capsule was firmly adherent. On section, the organ was seen to be made up of cysts of various sizes, from that of a pea to a pin's head. No distinction manifest between cortex and medulla. On section, the larger cysts were chiefly in the outer portion, and contained clear fluid; the smaller were full of caseous yellowish-white matter, limited by a fibrous-looking cyst wall. Between the cysts was the cortical substance, or what remained of it, in which were yellowish

streaks, which ran in no definite direction through the dull-red hard tissue. Numerous small caseous yellow nodules were scattered through the organ. In the situation of the medullary portion, the condition was very similar; the pelvis of the kidney being occupied by fat, traversed by fibrous bands. Renal vessels present, but small. Ureter was a small shrunken bloodless tube, pervious; no obstruction being found.

The cause of the atrophy in this case cannot, I think, be attributed to congenital defect, hydronephrosis, interstitial nephritis, or primary cystic formation. The shrunken organ, studded with cysts, was probably the result of previous scrofulous disease; the other kidney, as usual, doing double work.

Similar cases have been recorded, where one organ has been attacked, the other being unaffected (cf. *Lancet*, 1885, Vol. I., pp. 142 and 699).

Case III.—Hydatid Cyst in Site of Absent Right Kidney, and in Bladder.

An elderly badly nourished man was seen on May 30, 1888. He stated that lately he had been badly fed, had occasional nausea and vomiting, difficulty in passing water, which was scanty. He did not complain particularly of pain. His mental condition was peculiar. He seemed hardly to understand questions, and did not answer coherently. His articulation was defective, owing partly to total loss of teeth. He had tremor of lips and lower jaw on trying to talk. His skin felt cold and clammy, though the temperature in axilla was 99° F. Slight occasional rigors were noticed; tongue thickly coated with brown fur, rather dry; pulse feeble and irregular. On percussion over hypogastrium, no evidence of distended bladder. The passage of a soft catheter was tried, but it set up such spasm, and distressed the patient so, that the attempt was not continued.

May 31.—He slept badly, being at times delirious; temperature subnormal; mental condition worse; speech incoherent; has passed turbid urine in small quantities. Stimulants and diaphoretics were given.

During the next two days the prominent symptoms were delirium, vomiting, occasional rigors, and passage of scanty urine; temperature usually subnormal, with clammy skin. He gradually became comatose, and died on June 2, at 7 p.m.

Autopsy, June 4.—Abdomen only examined. Intestines of livid red colour, covered in parts with flakes of greyish lymph, and distended with flatus. A few ounces of turbid brown fœtid fluid were found in the pelvis. Left kidney large and congested; on section, cortex large, showing hæmorrhagic infarctions, and congestion in boundary area. Right kidney was absent, at least so far as any definite renal structure is concerned; its ureter in its upper half was degenerated into a narrow cord, which, traced upwards, was found to spring from a mass of what appeared to be perirenal fat; embedded in this fat was a cyst the size of a walnut. This, on section, showed a firm fibrous capsule, containing laminated layers of whitish-yellow membrane, and presented the appearance of a degenerated hydatid cyst. On cutting into the bladder, which contained little fluid, a clear grey translucent membrane was exposed. It was drawn out, and was found to be a collapsed cyst, the size of an orange when distended, and forming a lining to the interior of

the viscus. It presented the usual characteristics of a hydatid ectocyst, by its colour, consistence, and separable layers. No daughter-cysts were seen. Microscopically, the laminated layers were well seen, crystals of ammonio-magnesian phosphate being abundantly studded over the field. No hooklets were seen, but as a low power was chiefly used, they may easily have escaped observation.

This case is, I think, remarkable in many respects. It shows how hydatid disease may destroy the kidney in adult life. The shrunken condition of the ureter points to its previous existence, and the functional power of the kidney, which gradually atrophied. The bladder was affected by way of the ureter; then followed the urinary symptoms, which ultimately resulted in uræmic poisoning, peritonitis, and death.

Hydatids in the kidney are comparatively rare. According to Morris, Cobbold, and others, they affect the renal organs only once for every five or six times they are met with in the liver. They usually form large tumours, instead of being withered and contracted as in this case.

Dr. W. Roberts states that the ureter is a frequent route by which renal hydatids discharge their contents, but recorded case of hydatids in the bladder having this origin, are certainly rare.

In the *Lancet*, 1876, Vol. II., p. 176, is found a case of hydatid cyst in the bladder, about four inches in diameter. Others were attached to the liver and peritoneum; none in the kidneys.

The fact that no renal structure was left in the affected kidney, shows that hydatid disease must be put among the causes of secondary renal atrophy, a statement generally not noted by authors on renal disease.

These three cases, though they do not exemplify rare congenital atrophy of one kidney, show some of the conditions which destroy one of these important organs in adult life. However infrequent such instances of disease may be, the possibility of their occurrence is worthy of consideration in doubtful cases. The extirpation of a congenital single kidney is recorded in the *Lancet*, Vol. I., 1883, p. 514.

Surgeons in contemplating operations on the kidneys, have to bear this in mind. The many ingenious methods for ascertaining the presence and working power of a second kidney, such as catheterisation of the ureters, Teichmann's ureter forceps, endoscope, &c., show that modern surgery takes cognisance of these defects, however difficult the diagnosis may be during life.

The physician, too, may find the problem presented to him—how to ascertain whether one kidney is absent, or at least inactive. He will probably attend to the history and course of the case, and frequently examine the daily quantity and quality of the urine. Ralfe, Thudicum, and some German authors have shown how valuable a guide it is, to ascertain the proportion which the amount of urea bears to the whole amount of solids passed. Barker in the *Lancet*, Vol. I., 1885, p. 143, records how useful this line of research was in some cases.

Thus both in a clinical and pathological aspect, these degenerations of one kidney are important.* And in regard to the victims who

* Fagge states that a kidney enlarged by compensating hypertrophy, seems to be unduly liable to Bright's disease.

possess only one useful kidney, which is doing double work, we must bear in mind that their risk is intensified if any inter-current malady afflicts them, or if they meet with any of the accidents or thousand natural shocks which flesh is heir to.

THE MICROBE OF GONORRHŒA.

By M. V. Crivelli, M.D. Paris.

I have just published in the *Australian Medical Journal*, an account of the experiments made, to prove the existence of a gonorrhœal microbe. I was fortunate enough to be able to carry on such experiments under the best conditions, during the years I spent as resident surgeon in the Venereal Hospital of Paris. I found there every facility for examining and cultivating the microbe of gonorrhœal pus, in the hospital laboratory; such experiments having been carried on according to the rigorous method of M. Pasteur, and submitted to the high approbation of my friend and collaborator, Dr. Constantin Paul, a member of the Academie de Medécin de Paris. The results I arrived at were so conclusive, that they encouraged me to continue my experiments in Melbourne.

A few years ago, it was thought that gonorrhœa was a special inflammatory catarrh of the urethral mucous membrane. The scientific study of microbes, however, has now caused important modifications in our views of the pathology of this disease, as well as of many others. The principal character of gonorrhœa being the secretion of contagious pus, after a certain period of incubation, the several phases—incubation, purulence, and contagion, were sure to cause this disease to be classed amongst the parasitical maladies. So well was this recognised, that the first researches in that way were made at an already distant date; and if results obtained from these have not been confirmed, we can, however—thanks to the knowledge gained during the last few years—affirm that there exists a gonorrhœal microbe.

If, at present, the different phases of evolution and development are not formally ascertained, it is not premature to state that the few missing links necessary to confirm the theory deduced from the patient and the searching mode introduced to science by Pasteur, for the study of each particular micro-organism, will be completed at an early date.

To carry out successfully this study, it is necessary above everything, to be in a position to try reliable experiments on the microbe itself, as well as on its method of destruction. It is necessary to procure it pure and fresh, and to study closely exclusively acute cases, and the discharge of the first few days, during which the inflammation has not reached the posterior part of the urethra, and the free evolution of disease has not been modified nor interfered with by any therapeutic agents. To escape many errors, it is also necessary to experiment on male cases, gonorrhœal disease in women not being so favourable; owing to the anatomical disposition of the urethra, it is impossible to prevent the

liquid of the urethral discharge being mixed with the vulvo-vaginal discharge, thus rendering the search for the microbe difficult and unsatisfactory.

I have always found gonococci in all cases I have examined, here as well as in Paris. Taking the precaution to make the patient urinate, I used a sterilised bougie for collecting the pus, introducing it to a sufficient depth in the urethra. This pus, dried on glass, was stained with a weak aqueous solution of gentian violet, according to Ehrlich's method.

In these preparations, set either in Canada balsam or Dammar resin, I have always ascertained the presence of microbes of one kind only, whose morphological aspect was always the same. The outlines of these micro-organisms come out very clear. They are rarely isolated, especially when examining pus from acute gonorrhœa. They are mostly found in couples, nearly approaching in shape the figure 8, or in fours, or even joined in countless numbers, forming large rounded heaps outside of the cells. They generally correspond to each other, especially when grouped in twos, by flattened surfaces, and it is often possible to distinguish the edges of a capsule around each diplococcus.

These microbes are found in the epithelial cells, in the pus globules, and also in a free state, but it is in the pus globules that they are to be met with in greater numbers.

I have always found these gonococci in all my cases, even after a lengthened anti-parasitical treatment, when only a faint and hardly appreciable discharge remained. I have always found them, but in lesser numbers, in the pus of chronic gonorrhœal urethritis. All these examinations were made of pus taken from undoubted cases of gonorrhœa, that is to say, in cases where no other cause of contagion could be found. On the other hand, I have examined pus derived from urethral suppurations, caused by the use of the catheter and other traumatisms of the canal, and have never found gonococci.

There are thus two kinds of urethritis. In the pus of the *first*, nothing special is discovered, the suppuration is quite an accidental one; it is simple urethritis. In the pus of the *second*, it is always easy to ascertain the presence of micrococci, having always the same aspect, and *found exclusively in it. It is the true gonorrhœal urethritis, and the only one worthy of this name.*

The direct examination of gonorrhœal pus has thus proved that gonococci are always to be found in it; and although many of the authors, whose works I have quoted in my paper in the *Australian Medical Journal*, take it for granted that these micrococci are the pathogenical microbes of gonorrhœa, it was indispensable to isolate and inoculate them for the purpose of showing their character. This has been done by many observers, and it has proved the above contention.

I cannot give a better illustration of the careful and scientific method of investigation introduced by Pasteur, than by quoting the experiments carried on both by myself and my friend and teacher, Dr. Constantin Paul, when I was a resident surgeon in the Venereal Hospital at Paris:—

On the 10th December, 1883, I had a case in the hospital of a young girl of 16 suffering from recent gonorrhœa. The discharge from the vagina was copious, especially so from the vulvo-vaginal glands; the duct of Bartholini's gland also contained pus. I took a flask, which I

sterilised with a spirit lamp, and having collected a few drops of pus from these glands, I immediately sealed it up. I then hastened to M. Pasteur's laboratory, who had kindly received me as a pupil, and in less than an hour after collecting the pus, taking every usual precaution, and using a sterilised tube, I introduced one drop into a small flask known as Pasteur's culture flask, which contained a sterilised veal broth. The flask was placed in an oven; two days later (on the 12th December), the liquid in the flask was muddy, and indicated a multiplication of microbes. A corresponding flask (but purposely left without pus), placed for comparison, was perfectly clear. On the 14th, four days after the pus being added, I examined the liquid with a microscope, enlarging about 750 diameters, and ascertained the presence of a number of microbes, some isolated and some joined like the figure 8, and agitated by the Brownian or oscillating movement. I tried a second culture. On the 17th, seven days after the first addition of the pus, the liquid of the first culture is more thick, and shows chaplets of five or six articulations, some curved, some rectilinear. The microbes are much more visible than at the end of the first four days. On this same day, the liquid of the second culture, which is three days old, is muddy, and the comparison flask is clear. I may just as well state, once for all for the sake of brevity, that no experiment has been carried on without a comparison flask. The flask of the second culture, examined by the microscope, shows a few isolated microbes, proving that in twenty-four hours, microbes are already developed; but it takes from five to six days to arrive at a complete development. At the fourth culture, the microbes thus sown at the expiration of every four days were very numerous and active.

To inoculate active microbes, I prepared a new culture, and inoculated it on the fifth day. It was not easy to find a person who would agree to the operation. I procured, however, a young girl, not a virgin, but who had never had any venereal disease, and was suffering from headache with continuous vomiting, and paralysis of the bladder. These symptoms had then lasted for six months without change, and were of a hysterical nature. I did not inoculate the pus in the vagina, as I wished to prevent the propagation in the uterus and the Fallopian tubes. I made the inoculation at the entrance of the urethra, using a small drop of liquid as it is done with the cultures. Thus I had no fear of the consequences of the operation, and hoped that the irritation caused by this process would have the effect of exciting the contractility of the bladder. The inoculation was made on the 28th February, liquid of the ninth culture being used. No symptoms followed during five days. On the sixth, the patient complained of a burning sensation at the entrance of the urethra, and slight pain when urinating. The examination, which gave no results during the preceding days, now showed an evident urethritis, with a discharge of sero-fibrinous pus, which made the linen very stiff when dry. I had thus all the signs of gonorrhœa at its beginning, viz.:—First, an incubation lasting five days; secondly, a painful inflammation at the entrance of the canal; thirdly, a secretion of sero-fibrinous liquid, which stiffened the linen, causing it to stick to the organs; and lastly, pain during urination. This inflammation only lasted twenty-four hours; next day, all symptoms had disappeared.

I have succeeded in obtaining pure cultures of gonococci in broth, slightly alkalised; in from eight to ten days, these granulations would die and fall to the bottom, but the best medium for developing gonococci, is a broth of extract of meat, solidified with agar agar. This broth is prepared by mixing ten parts of Liebig's extract of meat, eight parts of pepton, and one hundred parts of water, with a small quantity of chloride of sodium and phosphate of soda; the broth then being completely neutralised by potash, agar agar is added; a neutral jelly is thus obtained, which being thoroughly sterilised, is kept in an oven at a temperature of between 30° and 35° C. Three or four hours after the inoculation in the agar agar, it is found that this substance is not more clear and liquified, principally on the surface, hardly or not at all deeper down. The gonorrhœal micrococcus is consequently an aerobial microbe.

When examining these cultures at this point, I have constantly found micrococci presenting a very peculiar appearance, which I have never seen described in any treatise on gonorrhœa. Small spherical granulations attached to each other, are to be seen; they form small chains, in most cases rather short, which join together in the shape of a star. The ramification of these stars, seem to be englobed in a hyalin substance.

If one of these small chains be examined singly, it is found that the granulations composing it, are not all of the same dimensions; here and there one is seen rather larger, well coloured, and with well defined outlines; the others, whose contours are not so apparent, seem to be smaller, this appearance is due to the colouring substance having only reached their centre, these micrococci of the first hours of culture, being indeed very difficult to stain.

If the same preparations are examined twenty-four hours after, one may still sometimes recognise the special disposition, which I have just described; but in most cases, the ordinary micrococci and diplococci only are to be found, such as they are described everywhere.

To me, the micrococcus of gonorrhœal pus shows, when cultivated, *two very different aspects* During the first few hours, the micrococci have a peculiar arrangement—they have a starry form easily seen, especially from the third to the sixth hour. The following day this has almost entirely disappeared, nothing is then found but spherical granulations, isolated or joined in groups of from twos to fours, and joined to each other by flat surfaces.

All the inoculations I have tried in Paris and in Melbourne with the cultivated micrococcus, either on the intact conjunctiva, or on a small wound produced on the conjunctiva, or on the urethral mucous membrane of dogs and rabbits, and guinea pigs, in Paris, and in Melbourne, gave an absolutely negative result. These inoculations however, notwithstanding this result, still are not void of interest. They show that the gonorrhœal microbe loses its virulent qualities by culture, or by being transported to grounds which seem to be unfavourable to its propagation.

The changes that occur in the cultivated microbe in the flask have a striking analogy with those which take place in the urethra (*although taking in the culture a shorter time*), where we see the pus getting, in time, less virulent, so much so, that discharge of long standing, where the gonococcus certainly still exists, are found to be non-contagious.

Since this new interpretation of the disease, as being of parasitical origin, is being given, it would hardly be pardonable in a medical man to neglect prescribing a rational treatment, which is based on a pathogenical conception of gonorrhœa. We know at present that gonorrhœal pus is virulent and contains a microbe, and we know how and where it is propagated. Notwithstanding the failures arrived at by a few authors with the antiseptic method, which seemed useless in a few cases, I am perfectly convinced that this method is the proper one to be employed when treating venereal diseases, and that all researches made in that rational direction will be found to be rich in results. It should always be used in the first stages of acute gonorrhœa, having generally an abortive effect on the disease, which is a sufficient reason for it being preferred to the ordinary treatment by emollient and internal medicines, generally prescribed in that first stage.

SECTION OF OBSTETRICS AND GYNÆCOLOGY.

PRESIDENT'S ADDRESS.

By Ferdinand C. Batchelor, M.D. (Durham) M.R.C.S.E.

Gentlemen,—My first duty is to thank you most sincerely for the high honour you have conferred upon me by electing me your president for this important section of your Congress, devoted as it is to a branch of our profession, in which, during the last few years, progress has been more rapid and startling than in any other in the domain of medicine or surgery, and I cannot but feel that the post has devolved upon me more from a graceful act of courtesy and good feeling on your part towards a neighbouring colony and sister university, than from any individual merit on mine.

With regard to the choice of a subject for this address, my first difficulty was to make a selection from so vast a field, and then to compress the topics to which I am desirous of drawing your attention within reasonable limits.

Midwifery and Gynæcology, individually, offer such immense fields of observation, that there has arisen during the present day a tendency to subdivide these subjects into distinct branches, a tendency which has already resulted, as we see in England and America, in the founding of distinct societies and journals, obstetric and gynæcological, all of which have plentiful materials for observation and discussion.

To-day, I propose to address you on subjects purely gynæcological, and my reason for doing so is this, namely, that in midwifery I know that there must be very many here whose opportunities for acquiring knowledge, whose years of observation and field of practice are immeasurably greater than anything I can offer for comparison. With regard to gynæcology, however, I have somewhat less diffidence; all real, solid and fixed knowledge has been of such comparatively recent growth, that within the compass of a few years of observation, it is relatively easy to marshal some of the principal events, and to note the striking changes and advances that have occurred in our reading of symptoms and methods of treatment. During this period of probably but little over a score of years, I would venture to make a statement which would be rash indeed to propound in any other branch of our

profession, viz., the whole literature of gynæcology, prior to this period, might be obliterated and our loss would be comparatively small, so vast and momentous have been the changes that have occurred within this time. Hence, although far be it from me for one moment to pretend to assume an authoritative tone, yet I feel it has been fairly within my power to have kept myself abreast of the current opinions of the day, and may therefore presume to review our progress, note some of our errors, bring prominently before you certain innovations in our practice which have hardly yet received the impress of authority, and point out subjects on which we lack information with a freedom I should be loth to assume with the sister-subject, midwifery.

Now, gentlemen, although from our attendance here to-day I judge we all take some interest in the special work of this section, I well know that the conditions of colonial practice are such that there are comparatively few amongst us who are able to devote ourselves wholly to one special branch, and hence I feel that the remarks I make must be addressed to a body of general practitioners, and if I touch upon what may appear to some, well-worn or too elementary topics, I trust I may on this plea be forgiven.

Before commencing the subject proper which I propose to treat, it will be well to first call attention to the immense advance of late years in our method of examination as compared with those in vogue twenty years ago. What in those days was considered by the bulk of the profession a thorough investigation of the uterine organs consisted probably in a mere digital examination, the patient at the time being attired in her ordinary clothing, the condition of the cervix and os uteri being noted almost solely, and the passage of the sound and speculum was probably looked upon as exhausting all the resources of our art. Very few men ever practiced the bi-manual method of examination systematically; the condition of the ovaries, pelvic peritoneum, or broad ligament were rarely noted, and the existence of a pathological condition of the Fallopian tube was practically altogether overlooked. The ease or difficulty with which the uterine sound passed, its position and length were considered as most important guides, and the appearance of the cervix, as viewed through a speculum, probably formed the basis of the diagnosis. What wonder then that deviations or presumed deviations of the uterine axis formed such an important element in the pathology of those days, and that from the appearance of the cervix uteri, as viewed through the speculum, false conclusions were drawn leading to treatment radically bad. Ulcerations, erosions and indurations of the cervix uteri hence acquired such undue prominence, and were treated as pathological entities instead of merely indicating, as is now generally recognised, grounds for further investigations.

But if we are to place any reliance in the statements of patients, in whose case the seemingly all satisfying diagnosis of ulceration would appear to have been made, I should judge there are a goodly number of our profession hardly yet emancipated from the teachings of these relics of the dark ages of gynæcology ; nor so long as men are content to found their diagnosis and formulate their treatment on the results of an examination conducted by sound and speculum alone, are they likely to discover their error.

And although I fear it may seem like slaying the slain, I would say a few more words upon this much mis-applied term—ulceration, the popular bug-bear of a large portion of our patients. The conditions of the cervix, with which we are all so familiar, has been incontestably proved to be no true ulceration whatever. A mere change in the character of the surface epithelium, a condition in itself, probably totally incapable of evoking any symptom whatever. How and why is it, that even in this day such an error in observation is permitted by so many to still hold sway. Surely if the term is mis-applied, its use should be abandoned, for not only does it lead the unfortunate woman to fear she is suffering from a more serious condition than there is any justification for, but it has this worse tendency, of making a too prominent impression on the mind of the practitioner himself, and leading him to overlook what are really more serious conditions.

It is in consequence of a loose, superficial and thoughtless phraseology, such as this, and lines of treatment or mal-treatment adapted thereto, that a not altogether undeserved opprobrium has in years past, attached itself to gynæcology and gynæcologists. Without a sound pathology to guide us, our practice has been too often conducted utterly in the dark : errors and fads of the most fantastic and preposterous description have been allowed to hold sway, and systems of treatment carried out not from a physiological and pathological basis, but merely in accordance with the particular teacher or author with whose views the practitioner has happened to be imbued. Thus, many an honest sceptic has ridiculed the whole subject of gynæcology, looking upon the symptoms complained of as merely whimsical or hysterical, and those who treated them as only a shade removed from the quack.

Hence, too great scope has been left for the unscrupulous practitioner, who has not been slow to avail himself of his opportunity ; his results equalled, or at any rate, were no worse than those of his more conscientious brethren, and by trading upon his patient's fears, he reaps a rich harvest. Gynæcology in the past has been so over-ridden by these pests, that for a time it began to acquire an unsavoury aspect, even to the profession itself, and it almost seemed as though the disorders of the generative organs in the female, were to be relegated to

a similar class of individuals to those who drive a lucrative trade by means of filthy advertisements, referring to diseases of the opposite sex. And although quackery in gynæcology blazons itself less openly, I fear it is an evil just as deeply rooted. The advertising quack is recognised, shunned, and avoided by his professional brethren, but the charlatan who treats a young single girl for what he designates an ulceration of the womb, throwing out vague hints that the condition may eventuate in cancer, administers chloroform on the pretext of performing some imaginary operation for its cure, but in reality, to extort an exorbitant fee ; or he who for *some slight irregularity of* the cervical tissue, proceeds to perform what he ostentatiously designates an Emmet's operation, solely to impress his patient with the idea that she is suffering from some terrible disease, the cure of which permits of his levying blackmail. This *type of scoundrel is, I fear, by no means extinct*, and he is more dangerous to the public, being more difficult to convict, and is even *a greater disgrace to our profession* than the self-assertive advertising quack.

From causes such as these, our branch has undoubtedly laboured under a certain odium, which at times honorable men have felt it hard to struggle against. Most of us have probably had cases which have fallen into the hands of these Philistines, who often succeed in bleeding their patient's purses proportionately to the discredit they can throw on the previous diagnosis ; but I sincerely believe and trust that their day is fast on the wane, and with an advancing knowledge of the pathological changes in the uterine organs, the fads and fashions which seem to have ruled our practice in the past, must be swept away, and diagnosis and treatment be as exact and scientific as in any other branch of medicine.

I say, therefore, that the first result of an increase in our pathological knowledge has been an improvement in our method of examination, and by this I do not mean that any startling addition has been made to our stock of instruments, or new means devised whereby the generative organs can be explored, but the improvement has been rather in doing away with our instruments, and trusting more to our reasoning and to the education of our special senses. Who, for instance, would diagnose an oöphoritis, a pelvic peritonitis, or a salpingitis from an examination with the sound or speculum? No! it is the finger, and the educated finger, which gives us our information; and if I were asked what has been the greatest advance in recent years in the practice of gynæcology, I should say, undoubtedly, that it is the systematic adoption of the bi-manual method of examination. But I hear some of you say, "Oh! that is as old as the hills;" but I would reply, that the systematic adoption of this method is not "as old as the hills," and more than

that, I say without hesitation, that thorough and systematic bi-manual examination is only carried out by a very small percentage of practitioners even in the present day, and until it is adopted generally, until the finger is efficiently educated, and its teachings properly appreciated, the commonest causes of diseases in the female generative organs will be overlooked, and being overlooked, the majority of cases mis-treated.

Possibly some of you may think I have a hobby, and am riding it to death, but when I see, as doubtless many of you see, cases of oöphoritis, and pelvic peritonitis, and salpingitis, which have been treated for months, and sometimes years, by pessaries, applications to the cervix, intra-uterine stems, and what not besides, and the true cause of the patient's sufferings not even suspected; and when we remember that until six or seven years ago, the most eminent leaders in gynæcology throughout the world had apparently altogether overlooked a disease, viz., salpingitis and its complications, which we now recognise almost daily by this method of examination alone, I feel I need make no apology for dwelling thus at length on the absolute necessity there exists for every one who attempts any gynæcological work whatever, to perfect himself in this most important method of investigation.

And now, leaving what I may term introductory matters, which, however, seemed to lead up to my subject to day, and could not from their importance be dismissed with a passing word, I beg to bring before your consideration some recent advances in our diagnosis of diseases of the uterine organs, and in our methods of treatment—methods which seem to me in a measure to revolutionise the practice of gynæcology, and to demand a re-consideration, alteration, and re-arrangement of our popular text books.

If we refer to writings and articles published on subjects gynæcological, we find that during the last three or four years, there has been a somewhat remarkable change in the class of cases published in our journals, or discussed at the meetings of our societies; until a very recent date, uterine displacements, cervical lacerations and their repair, menorrhagia, dysmenorrhœa, hæmatic and inflammatory effusions, were the topics of discussion. Search where you will, until even as late as the meeting of the International Medical Congress in London, in 1881, and you will fail to find the report of a single operation for salpingitis: and although Battey had reported cases of removal of the ovaries as early as 1872, it was not until fully ten years after this that the frequency of morbid changes in the tubes and ovaries (apart from gross tumour formations) acquired any practical importance. During the last three or four years, however, you will find that reports on cases of salpingitis, pyo-salpinx, hydro-salpinx, oöphoritis, and peri-oöphoritis, constitute a considerable bulk of gynæcological literature, and it is to

these subjects that I wish to-day specially to devote some attention, believing as I firmly do, that a new light has been shed on our practice, vastly surpassing any other recent innovation, and before which such minor improvements as operation on the round ligament, or repair of lacerated cervices, must pale indeed, so far reaching are the changes in our views, so pregnant for practical application, so great the proportion of cases brought from the region of the vague and indefinite, to within the range of exact and certain diagnosis, so large a proportion of suffering women may thereby be relieved from lives of misery.

To bring this subject at all systematically before you, I must first refer to a very remarkable essay, published by MM. Bernutz and Goupil about 30 years ago, and translated by Dr. Meadows for the Sydenham Society, and published by them in the year 1866. Here are collected a series of 99 cases of pelvic peritonitis, several of which were under the immediate observation of M. Bernutz throughout their course, and he reports on them fully, together with post-mortem appearances. The cases presented these general features:—The Fallopian tube was in every case the seat of morbid change, generally irregularly dilated or pouched, containing purulent or caseating material, its extremity adherent to the ovary or surrounding pelvic peritoneum, and a general matting together of the pelvic viscera.

These observations, although at the time attracting considerable attention and discussion, and subsequently occasionally referred to, never apparently acquired any practical importance until within the last ten years; and it is a remarkable instance of the recognition of a morbid condition which seemed for a number of years to be passed over and forgotten, owing to the fact that no practical use was made of the discovery at the time. It was not until the recent advances in abdominal surgery—not until the peritoneal cavity had been demonstrated to be so tolerant of manipulation, that these morbid conditions were again brought to light, and their full importance as a factor in the production of disease, realised. And, if to M. Bernutz is ascribed the credit of first recognising the importance and frequency of changes in the Fallopian tube and surrounding peritoneum, to Lawson Tait must, undoubtedly, be awarded due fame for first suggesting and putting into practice methods of treatment for the relief of these conditions. Lawson Tait it was who first published reports of the removal of diseased appendages; demonstrated their importance in the production of pelvic peritonitis; boldly, and in the face of much factious and jealous opposition, pressed upon the profession the frequency of morbid changes in the tubes, the method of their recognition, and the comparative safety of operative measures in those cases which demanded relief, otherwise unobtainable. Reference to our ordinary text books for information

concerning these diseases will give but little practical information; a chapter may be found in the more recent works devoted to morbid changes in the Fallopian tubes, but any description adequate to the importance of the subject is altogether wanting.

The accounts of chronic ovarian inflammations are, as a rule, brief, fragmentary, and unsatisfactory; and there are hardly two authors who hold the same views on the subject of pelvic peritonitis and pelvic cellulitis. The points I shall endeavour to prove to you to-day are these:—

First.—That the most common causes of severe pain and chronic suffering, in connection with the diseases peculiar to women, are morbid conditions of the ovaries, Fallopian tubes, and surrounding pelvic peritoneum.

Second.—That these changes have, relatively to their importance, attracted but little attention; while diseases of the Fallopian tubes have practically been altogether overlooked by the whole profession.

Third.—That great confusion still exists as to the relative frequency of inflammation of the pelvic, peritoneal and pelvic cellular tissues, some even contending that they are clinically inseparable; whereas, pelvic peritonitis is a separate and distinct disease, very frequently met with, and mostly due to an extention of inflammation along the tube. Pelvic cellulitis is an excessively rare disease, and almost unknown, except as an accompaniment of acute general septicæmia.

Now, to consider my first proposition, that changes in the uterine appendages are the most common cause of severe pain and chronic suffering among the diseases of women. Those who have recognised these conditions, and possibly in severe cases operated for their relief, and observed the brilliant results following removal of diseased appendages, will hardly think this proposition requires any proof whatever; others, whose attention has not been particularly drawn to the subject, will at once ask, how is it, if these affections have the frequency, severity, and importance here ascribed to them, they should be dismissed from our popular text-books with a brief consideration of some fifteen or twenty pages? I would answer, that although oöphoritis, pelvic peritonitis, and even salpingitis, have separately received some brief notice, the combination of these changes, as forming a distinct type of disease clinically, has only been of such recent recognition, that they have not yet impressed the minds of gynæcological writers with their importance. The whole of this subject will require a thorough revision; but with the unsettled and conflicting

views still existing on some points, it is an extremely difficult matter to dogmatically lay down any comprehensive and accurate scheme.

As regards diseases of the ovaries of the less gross type, such as cystic and cirrhotic changes, I must say a few words, although it is not with purely ovarian conditions that I wish to deal to day. Although the ovary has long been recognised as the seat of severe pain, producing pronounced and well-marked symptoms, we are still almost entirely in the dark as to the pathological conditions on which these symptoms depend. The late Professor Schrœder recently remarked, that "the subject of ovarian pathology, apart from tumour formation, is practically a blank."

Dr. Henry Coe, of New York, in an article in the recently published *American System of Gynæcology* says, writing of the Anatomy of the Ovary, "The boundary between the normal and pathological is not a fixed one, and in spite of numerous careful studies of the subject, there still remain many moot points. The microscopist who succeeds in determining to what extent an ovary may contain cysts, without being cystic, and how much fibrous tissue may exist in its stroma before the diagnosis of cirrhosis is justifiable, will deserve no little praise." And when the microscopist has decided as to what is a normal, and what a diseased ovary, the clinician still finds a great gap to fill up. namely, to decide why an ovary in one subject may be cystic, cirrhosed, or atrophied, producing little or no discomfort; while in another, an even small amount of cystic change, fibrous deposit, moderate binding down, or slight prolapse, will induce most severe and constant suffering.

Here, we still grope in utter darkness. The mere fact of an ovary containing a number of small cysts, or its stroma being abnormally dense, does not at all preclude the possibility of its still retaining its function sufficiently to produce healthy ova, capable of further full development. The influence of the mind in modifying affection of the generative organs is too well known to all to require more than a passing reference on my part. No condition of physical suffering can be more readily developed by injudicious attention. Given a neurotic subject, some slight or passing derangement of the generative organs, and an inquisitive solicitude on the part of the medical attendant, with a penchant for ovarian troubles, and you have *the surest makings of an inveterate form of ovarian invalidism.* Pain, *per se*, is not a particularly reliable symptom, nor one which we are apt to overrate in an hysterical subject, in whatever part of the body occurring. Yet in the great majority of affections of the female generative organs, that peculiar condition of the nervous system which we designate hysteria, is more or less a constant accompaniment.

Paget, in his lecture on the Nervous Mimicry of Disease, draws attention to many points that have an application in the condition now under consideration. In most cases of nervous mimicry, the patient first receives her mental impression from seeing or hearing of some form of disease which her acquired ailment simulates more or less closely; and in these days when it would appear as if the various affections of the female organs seem to be a not unfrequent and engrossing topic of conversation at ladies' afternoon teas; when Mrs. A.'s displacement, or Mrs. B.'s ulceration is freely and fully discussed; when, as I have reason to know, young girls yet in their teens are present at conversations of this kind, I say it is not wonderful that *ovarian aches and pains are becoming alarmingly common*, and it behoves us as a profession, to be sharply alive to the fact that such a condition of affairs may exist as a *nervous mimicry of disease, even in the ovary.*

I take it as not a little remarkable, that of late years hysterical knee-joints and hysterical spines, at one time fairly common, are now excessively rare, and when met with, as a rule it is in a country patient from an out of the way district; and I have seen more than one instance when such a patient, having been removed to town, and become cured of her joint trouble, has subsequently found out that she has made a mistake, and that it was her uterine organs that were at fault.

Now-a-days, I believe our patients not rarely take on a nervous mimicry of disease in the form of an ovarian pain, and when we are dealing with an evidently neurotic subject, we must remember Paget's dictum—"that our diagnosis must be founded, not on our patient's sensation, but on our own." The fact of any ovary being the site of some pain, somewhat abnormally sensitive, slightly altered in size or consistence, or prolapsed, does not justify its removal; and I hold that *the unnecessary removal of the ovaries is morally quite as culpable an act as the amputation of a hysterical knee-joint.* Although, in my own mind, I am satisfied that severe pain and constant suffering is occasionally met with in connection with cystic and cirrhotic changes in the ovaries, apparently uncomplicated by other conditions, I am convinced that these cases are comparatively rare; and there can, I fear, be little doubt, that a number of oöphorectomies have been performed without sufficient justification. Once the abdominal cavity is opened, it requires a considerable amount of moral courage to stay one's hands, and few are the ovaries which to the eye of the enthusiastic oöphorectomist will not present some flaw to justify their removal—it is a case of the horse-dealer and the nag without a blemish.

With regard, however, to tubal disease, and alterations extending therefrom to the neighbouring pelvic peritoneum, the case is far

different. The changes effected by disease are gross and characteristic. Anyone who has watched even one well-marked case of this type, or viewed the extensive alteration in the Fallopian tube and pelvic peritoneum, noted the misery and ill-health induced thereby, and the brilliant results following removal of the diseased organs, cannot fail to recognise in such a condition the cause of severe local and constitutional symptoms, beyond all possibility of doubt. Permit me to read you the report of one such case which I specially select in consequence of the severity of the symptoms, the characteristic pelvic changes, and the striking results of treatment:—

E. P., æt. 27, married, seven children, admitted to Dunedin Hospital August 8th, 1888. Confined in February last, labour difficult. During pregnancy had suffered from pelvic and sacral pains; after confinement, these had become more constant and severe. General health much affected, losing flesh fast. Menstruation frequent, irregular, and profuse; copious leucorrhœal discharge. The patient is dull and listless, and in a semi-typhoid state. Answers in a whisper; gums and tongue covered with sordes, breath offensive. In consequence of the apathy and debilitated state of this patient, it was exceedingly difficult to obtain any definite history of her previous condition, and it was at first thought that she was suffering from typhoid or some cerebral trouble, and was consequently placed under the care of one of the physicians. As however the history of severe and constant pelvic pain, following confinement, was elicited, I was asked to make an examination of the pelvic organs. The abdomen was somewhat distended, and excessively tender to the slightest pressure over the pelvic region.

Vaginal examination.—Vagina patulous; cervix somewhat fibrous; os points backward, and fissured. Body of uterus anti-flexed, and somewhat enlarged. Bi-manually.—In the right lateral vaginal fornix a hard, irregular infiltration was felt, spreading from the uterus towards the posterior and lateral wall of the pelvis. In the left lateral fornix a similar infiltration, but more posteriorly, and not so well defined. Vaginal examination caused considerable pain, which was specially marked in the region of the irregular infiltrations in the lateral fornices. The patient was so excessively ill, and complained of such constant and severe headache, that I was inclined to think at first there must be some other trouble in addition to the condition of pelvic organs.

Dr. Lindo Ferguson kindly examined the eyes, as cerebral trouble was suspected. Motion of eyes normal; pupils semi-dilated, sluggish; veins of fundus of both eyes full and slightly tortuous; nasal edge of disc rather ill-defined; both discs redder and more irritable than normal. It was determined to keep the patient under observation for some days.

The temperature averaged about 99·5°; pulse small, weak, 110 to 120. No appetite; no thirst. Pelvic pains and constant headache. Bowels only acted by strong purgatives. No further symptoms developing, and the patient's condition gradually deteriorating, on August 23, the abdomen was opened in the usual manner. My first impression on passing the hand into the pelvis was, that it was almost blocked up by hard irregular masses of exudation. The fundus uteri being identified, the left tube was traced outward from it for a short distance, it was then found to bend acutely backward and inward; the portion of tube beyond this flexion was considerably dilated, thickened and irregularly pouched, it was traced backward and downward into the pelvis, and its extremity was found intimately adherent to a large ovary—ovary and extremity of tube being matted to pelvic wall by fibrinous adhesions. Ovary and tubes were freed, ligatured, and removed. On the right side, the tube was similarly enlarged, pouched and dilated; the tissues were firmly matted together, rendering their identification and removal difficult. The posterior surface of the dilated Fallopian tube had formed firm adhesions to the ascending colon. The extremity of the tube was adherent to the ovary. The ovary itself was small, lying deep in the pelvis, below and anterior to the extremity of the tube. Considerable force was required to separate adhesions. Between the posterior portion of the dilated Fallopian tube and ascending colon, the adhesions were firm and well-organised, the walls of the bowels itself being much thickened for a surface about the diameter of a shilling. It was feared the tube might communicate with the bowel, and consequently, was opened freely along its whole length. The lining membrane was thickened and rugose, and is some places broken down; semi-purulent and caseating material blocked the tube, but in no place did it communicate with the bowel; it was carefully dissected off the colon, and removed. Hæmorrhage was free during separation of adhesions, but was arrested spontaneously.

The day following the operation, the patient volunteered the statement that her head was clearer, and that she was freer from pain in the abdomen than she had been for some months. She made a rapid and uninterrupted recovery, and within eight weeks of the date of operation, had taken a situation as a general servant, and was able to perform all her duties to the satisfaction of her mistress.

This was a most striking case. Here was a poor woman who had been confined to her bed for weeks, suffering constant pelvic and reflex pains—so ill that her condition was, on admission, looked upon as due to typhoid or meningitis—and yet we see her restored to perfect health within two months after the removal of the diseased uterine appendages. This is but one out of a series of between thirty and forty somewhat

similar, though not so severe, cases that have come under my observation during the last two years, in a small town, with a population of less than 50,000 inhabitants.

Now let me refer you to text books of the day, to seek an explanation of those cases of severe and chronic suffering, which we all not rarely meet with in our daily practice. Take Hart and Barbour's work, as containing the best epitome of the most generally accepted views on gynæcology. Chronic cervical catarrh, cervical erosion, or what in the past has been wrongly termed ulceration, is described as "a very common condition, and one of the most troublesome which the practitioner has to treat." The symptoms given are four—leucorrhœa, pain in the back and loins, irregular menstruation, sterility. Pain in the back and loins, they say, are present in all uterine diseases, and I say in probably a good many other diseases; so there is nothing distinct about this symptom. Irregular menstruation is said to be due to an extension of the inflammatory change, to the endometrium, in fact, due to something else, not to the cervical catarrh. Sterility is certainly not peculiar to cervical catarrh. In fact, the only symptom which, on analysis, is in any way pathognomonic of the condition, is the peculiar albuminous discharge. This is exactly what we find in practice; beyond a slight occasional backache, a little general debility, probably as much a cause as a sequence, and some slight albuminous discharge, we do not find that this condition will produce symptoms by any means marked or constant, and therefore, we may exclude it from our list of causes of severer symptoms.

Then to refer briefly to various displacements :—

Ante-flexion.—The symptoms are, by the same authorities, dysmenorrhœa, sterility, and in addition, sometimes leucorrhœa, and menorrhagia. Nothing here to account for severe pain.

Then take retroflexion and version from the same authors. The symptoms given are—weakness in the back, painful defæcation, and *symptoms of chronic pelvic peritonitis.* Yes, it is in this last symptom, you have the key to the true cause of the sufferings in retroflexion and version, viz., the chronic pelvic peritonitis. Reduce the simply displaced uterus, and the symptoms such as they be, disappear with it; but if the uterus is bound down by adhesions, the result of chronic pelvic peritonitis, and if with the displaced and bound-down uterus the ovary should also happen to be engaged, pessaries or any other treatment of the kind will, I fear, avail little.

Lacerations, Hart and Barbour say, present no symtoms, but other conditions may arise secondarily; so we will dismiss lacerations. Stenosis of the cervix—dysmenorrhœa, sterility.

Endometritis.—Here Hart and Barbour give a goodly list of what they call leading symptoms, nine in number. I will not detain you to enumerate them, but will merely mention that so excellent an authority as Dr. Matthews Duncan considers it an extremely rare disease, and he tells us, in the last edition of his work on "Diseases of Women," that Dr. Godson of St. Bartholomew's Hospital failed to observe a single case in the out-patient department of that hospital during a whole winter season, although Dr. M. Duncan was evidently wanting one badly for clinical observation.

Finally, after running through the list of the more common affections, we come to chronic metritis, and this disease Hart and Barbour describe as the most important of all diseases of women; the sufferings of the patients in cases of displacement of the uterus, they say, is due, not so much directly to the displacement, as to the chronic inflammation secondary to it. Well, I come across cases of chronic thickenings and enlargements of the uterine tissues fairly frequently, and in my experience this condition has been accompanied by a rather remarkable immunity from any symptom whatever; but still, in a humble practitioner like myself, it might appear somewhat presumptuous to set up my own opinion in opposition to that of Messrs. Hart and Barbour, were it not for the fact that, after looking through Dr. M. Duncan's third edition of "Diseases of Women," published in 1886, I fail to find any reference to chronic metritis, and I can hardly imagine this eminent gynæcologist attaches anything like the importance Messrs. Hart and Barbour do to this condition, when, not only is there not a single chapter in the whole work devoted to it, but, as far as I can find, not even a passing reference. Consequently, as a result of a somewhat cursory review of this well-known work, if we exclude pelvic peritonitis and pelvic cellulitis, we are left in the awkward predicament of finding no described diseases whatever that shall account for the vast majority of the cases of severe and constant suffering we meet with in actual practice.

Now, of pelvic cellulitis and pelvic peritonitis I shall speak later on, and I think it is here that we shall find an explanation of our difficulty, and so far, I think I may claim that amongst the diseases I have considered, there is nothing to account for the severer forms of suffering.

And now to the consideration of my second point, viz., that diseases of the uterine appendages have attracted but little attention relatively to their importance, and that diseases of the Fallopian tube have practically been altogether over-looked.

Until Lawson Tait published the remarkable results of his operations for the removal of diseased uterine appendages, the general gynæcological world would seem to have altogether failed to discover disease in these

organs, if unaccompanied by gross tumour; while now, since our attention has been directed to the matter, we are every day becoming more familiar with the morbid alterations in them produced by inflammatory affections, changes often so ready of recognition that even students with a very moderate amount of practice in examination, rarely fail to identify them. When we remember that these changes have been systematically passed over by men who must have been in the habit of meeting them daily, I say it does more credit to our profession for its fidelity to creed, than to its originality of observation; and I regret I must also add, that it would seem as if certain high authorities, apparently disgusted with their oversight in the past, would now bolster up their present false position, by ignoring or attempting to ridicule the importance of this great advance.

The day for bowing to authorities is fast on the wane; errors of omission, such as these, shake men's faith in such leaders and make them self-reliant, trusting more to their own experience and observation. Why, only three years ago, when I visited London, the subject of tubal disease was just commencing to attract some little attention; the importance of the changes and pathological condition were entirely mis-apprehended. Pyo-salpinx was then looked upon as the sole disease; and the only conditions demanding operation were those where the tube was distended with pus, giving rise to the sausage-like tumours described by Tait. In fact, I remember one well-known teacher jesting at the whole subject, and explaining to his class that the only symptoms were a sausage-like tumour, pain preceding menstruation, and menorrhagia, and consequently, it was a condition impossible to diagnose with any certainty. But expressions of this kind only showed how entirely ignorant the profession were at the time of the subject. Tubal diseases demanding operation are by no means confined to pyo-salpinx, in fact, in only a very small percentage of these cases requiring operation will the tube be found distended, and forming a sausage-like tumour. In only one case of a number in which I have operated, or seen operated on by others, have I found the tube greatly distended with pus, and in that case the symptoms were by no means so severe or urgent as in several of the others.

From my comparatively small experience, I would say that the class of cases in which operative measures are most demanded, are those in which the tube is sealed down on the ovary or pelvic wall, when the walls of the tube itself are thickened, sacculated and pouched, and the seat of chronic inflammation; where the ovary is fixed down by adhesion, the result of inflammatory changes in the neighbouring peritoneum; and where the patient is suffering constant and severe pain, or the subject of recurrent attacks of pelvic peritonitis.

Now let us proceed to the consideration of my third proposition. I believe there still exists amongst the profession, great confusion as to the relative frequency of inflammation of the pelvic peritoneal tissue, or pelvic peritonitis, and the pelvic cellular tissue, or pelvic cellulitis; and if I were to put the question to this meeting, I strongly suspect the answer I should get would be, that these diseases were about of equal frequency, possibly, that they ran one with the other, and were clinically inseparable, and it was practically a matter of little importance as their treatment was the same. Up to within the last few years, the latter portion of the reply might have been correct enough; recent experiences, however, strongly point in an opposite direction, and show that the treatment applicable to these conditions is fundamentally different.

I will quote from some authorities which support the views recently entertained.

West considers the condition of pelvic inflammation as an acute purulent œdema, and thinks pelvic peritonitis a rare lesion. Graily Hewitt maintains "the actual seat of the effusion is, in most cases, in the meshes of the cellular tissue surrounding the uterus, between the folds of the broad ligament, and extending thence in various directions towards the pelvic wall; but it is probable," he adds, "that in some cases of pelvic inflammation, there is an inflammatory condition of the peritoneum itself." Emmet, to whose observations I would specially ask attention, writes thus, "the terms peri-metritis, and para-metritis, are not applicable, as they express a theoretical distinction only, and differences which cannot be recognised clinically, at least" he says, "I must acknowledge my own inability to make any distinction at the bed-side. It is inconceivable that inflammation of any portion of the pelvic peritoneum can exist without involving the cellular tissue in relation with it. Whatever the exciting cause, pelvic peritonitis cannot exist alone, but must rapidly involve the cellular tissue in its vicinity. I shall," he goes on to say, "employ the term cellulitis as expressing the common condition of pelvic inflammation in connection with the non-puerperal diseases of women. Pelvic peritonitis will not be treated of as a distinct lesion, but as an accident rendering the case of general cellulitis the more grave in character from the complication." Further, he says, "I do not exaggerate when I assert that pelvic cellulitis is by far the most important disease with which woman is afflicted, it is the most common and becomes the most important, it being comparatively seldom recognised when limited in extent;" then he remarks "that many practitioners habitually neglect to recognise forms of circumscribed cellulitis, and do not appreciate its importance if accidentally they do recognise it." Then, describing the method of recognition, he says, "when the finger is passed into the vagina, it

should be passed first to one side then to the other of the uterus, to detect any thickening in either broad ligament, which would indicate the disease. With one hand on the abdomen, and the index finger of the other in the vagina, it is easy to judge of the extent of the thickening, and whether the disease is still smouldering, as it were, as evidenced by the pain produced by pressure."

Now these views of Emmet's are most important in their bearings on the subject we are now considering—"*I do not exaggerate when I assert that pelvic cellulitis is by far the most important disease with which woman is afflicted.*" With a great many of these views of Emmet's I most thoroughly concur. I recognise fully the very excellent work he has done in drawing attention to the frequency and importance of these thickenings and indurations in the region of the broad ligaments. Emmet's description of their method of detection is sound, but the inferences he has drawn from his observations are *radically and fundamentally wrong*, and for this reason, Emmet made these observations before the days of frequent laparotomies; before Lawson Tait and others had published their remarkable observations. Had Emmet proceeded a step further, and cut down through the abdominal walls, and examined some of these thickenings in the region of the broad ligament, as is now being done almost daily, he would have found that these thickenings, puckerings and fibrinous infiltrations *are not in the tissue of the broad ligament at all, but behind and distinct from it;* and that the masses which are detected by bi-manual examination, consist of thickened and dilated Fallopian tubes; adhesions of fibrous exudation from peritonitis, binding together tubes and ovary; circumscribed exudation of lymph around ovary, or shut off into loculi; all strictly peritoneal, or tubal, but the cellular tissue of the broad ligament itself entirely unaffected.

Of this, I will offer for proof the result of a series of cases which have passed under my own observation during a period of less than three years. Some two years and a half ago, after reading Lawson Tait's reports on cases, I came across a poor woman, who for three years had suffered severe and almost constant pelvic pain, totally incapacitating her from attending to her household duties, and only obtaining temporary relief from her sufferings by rest in bed. In her I detected what I had often observed before in women with similar chronic symptoms, viz., thickening about the posterior surface of either broad ligament, tending to spread posteriorly and towards the lateral pelvic wall. Imbued with the teachings of Emmet and others, these thickenings I had in the past always ascribed to chronic pelvic cellulitis or infiltration into the cellular tissues of the broad ligament. With some considerable trepidation, I confess, I cut down and found that the exudation was *not in the*

broad ligament, but consisted of peritoneal adhesions surrounding a thickened tube and adherent ovary. With some difficulty these diseased appendages were enucleated, freed, ligatured and removed. The patient made a rapid recovery, was entirely relieved of her former pain, and in a few months one would have hardly recognised in the florid healthy-looking woman the miserable complaining invalid prior to the operation.

Very quickly other similar cases came under observation, such cases as so often pass from one doctor to another, until at last they give up all hope of receiving any relief. All presented the same clinical features—thickening in the lateral vaginal fornices, constant pelvic pain, occasionally recurrent attacks of an inflammatory nature. When, after a trial, ordinary measures had failed to give relief, I cut down through the abdominal walls, at first fearing always to find the inflammatory changes *in the broad ligament*; but as case after case came under observation, and abdominal sections showed the same results—pelvic peritoneal adhesions, thickened tubes, and adherent ovaries—I began to recognise how in the past *I had been led astray, swayed by a false pathology.*

During the last two years I have operated upon fifteen of such cases, and my friend and colleague, Dr. Maunsell, has during the same period operated upon an almost equal number. By his kindness, courtesy and professional zeal, I have had the opportunity of confirming my observations. In every case operated upon, we have found the conditions described, never once an infiltration of the broad ligament; rarely, when the inflammatory changes have been intense and extreme, the broad ligament has been found thick and fleshy, but never a condition in any way approaching an induration. These observations have been sufficient to settle my views on the matter. No authority, however eminent, could shake convictions drawn from the results of a series of cases such as these.

Now I should like shortly to refer you to some authorities as to the frequency of morbid changes in these appendages.

Winckel's recent work may, I think, be taken as containing sound views on the pathology of the female generative organs. You will find in this work a table of the different anomalies observed in the Fallopian tube in a series of 575 subjects; and, as the result of these observations, he makes the following remarks:—"From this table it is evident that the tubes show a remarkably large number of affections and anomalies during early life, and that they are predisposed to a great variety of affections at all ages, almost one-third of all female cadavers showing disease in these organs." Numerous observations, confirming the frequency of tubal diseases, are now being made on all

sides, and it is evident that this fruitful source of disease has, in the past, altogether failed to attract clinically our attention. Winckel, I would also ask you to note, as a pathologist, almost agrees with Emmet, as a clinician, allowing for the latter's error in observation as to the true reading of the masses of exudation felt in the region of the broad ligament. Thus Winckel states that "*pelvic peritonitis is of one the most common and most important affections of the female sexual organs.*" He adds, "I have found it in more than 33 per cent. of all my autopsies;" and regarding it he further remarks, "even in those cases in which the symptoms do not become grave, and the processes run apparently a favourable course, there are such frequent recurrences, and the patient is so distressed by the distortion and tension produced by the adhesions, that life is made a burden, and it is only after the occurrence of the menopause, that some improvement takes place."

Then referring to Bernutz and Goupil's works, as containing the earliest recognition of these inflammatory processes, Bernutz says, "nor do I consider I exalt its importance too much in saying, that the future knowledge of uterine pathology is as certainly subordinate to our acquaintance with these affections as pulmonary pathology has been to a complete knowledge of the thoracic serous membrane." Bernutz proceeds to report on a series of thirteen cases, where careful clinical observations were checked by very complete and exhaustive autopsies. On these he remarks, "it was not until the unfortunately fatal termination of two cases, that I was able to prove incontrovertibly that the *peri-uterine tumour, which during life presented all the symptoms of the so called peri-uterine phlegmon (cellulitis), was not situate in the cellular tissue at all.*" His further post-mortem examinations showed, in all cases, very similar conditions—pelvic viscera bound down by false membranes; uterus often adherent to the bladder or rectum; the Fallopian tube bent on itself, dilated, thickened, and in the majority of cases containing pus; the tube often adherent to the ovary, and its fimbriated extremity occluded. One constant condition, in all these cases of pelvic peritonitis, was diseased Fallopian tubes. In none, any infiltration of the cellular tissue of the broad ligament. As regards then cellulitis, Bernutz remarks, "it would seem, from its anatomical disposition, that inflammation of the cellular tissue almost necessarily tends towards the abdominal wall, or else to the deep iliac fossa—hence phlegmons of the broad ligament ought to be studied with phlegmons of the iliac fossa, of which they are a very interesting variety."

Dr. Matthews Duncan, as early as 1869, writes:—"The adoption of Bernutz's views is not founded on clinical observation merely, but on several post-mortem investigations made by myself, or for me by able

pathologists." It is, however, curious to note that this same authority, so late as in 1886, writes of salpingitis as a disease almost unknown, our scanty knowledge being chiefly derived from the dissecting-room.

Dr. Gaillard Thomas, in 1868, writes:—"Since the publication of these views, I have directed my attention particularly to this point, and from careful observation, both clinical and post-mortem, feel warranted in recording the conclusions at which I have arrived—

First.—Cellulitis is rare in the non-puerperal state, while pelvic peritonitis is common.

Second.—A large proportion of cases, now regarded as cellulitis, are really peritonitis.

Third.—The two affections are distinct from each other.

Fourth.—They may be differentiated from each other.

But let us refer to more recent work—work performed with the object of testing the accuracy of Lawson Tait's statements.

Professor Polk, in a very recent article on peri-uterine inflammation, says:—"In a large number of post-mortem examinations made in the dead-house of the Bellevue Hospital, nothing is more common than to find evidence of peritonitis about the ends of the tube;" and further on, "the ovary may be always said to be implicated in these peritoneal inflammations, the fimbria which attaches it to the tube forming a ready transmitter of the process to the ovary." Polk also, as a result of a large number of post-mortems, noticed that except in those patients who had died of septicæmia, it was the rarest thing to find cellulitis: and in a series of cases, he points out how the symptoms and signs present were those of pelvic peritonitis and pelvic cellulitis, while the abdominal section showed salpingitis, peri-oöphoritis, and peritonitis.

Dr. H. C. Coe, pathologist to the Women's Hospital, New York, referring to the subject of peri-uterine inflammation, states:—"Peritonitis is certainly the most prominent element in most of these cases, as far as the post-mortem evidence affords any light. By far the greatest number of these indurations are situated high up in the broad ligament, and consist of cicatricial masses, mostly confined to the peritoneum of the tubes or ovaries, surrounded by old adhesions, or occasionally an imprisoned knuckle of intestine. The thickenings of the sacro-uterine ligament, so frequently alluded to in works on gynæcology, have, when carefully dissected out, proved in my experience to be due, not so much to a disease of the connective tissue of these ligaments, as to a cicatricial condition of the peritoneum covering them." Then, "I confess, that I have rarely found such thickening in the cadaver which could be referred to a fair and straightforward cellulitis or inflammation of the connective tissue, and this too *when I have recognised, by vaginal touch before and after death, what seemed to be an induration, or distinct*

band extending outwards from a deep laceration of the cervix, or a condition of tension in or about one lateral *cul de sac*." The same pathologist, reporting on half-a-dozen fatal cases following Emmet's operation and cervical incision, in which he had made post-mortems, says:—"In every case the cause of death was acute diffuse peritonitis. The inflammation could be traced straight up from the wound along the mucous membrane of the uterus, along the tubes, and thence to the peritoneal cavity."

Richard Maury, in an able article on Peri-uterine Inflammation in the *American System of Gynæcology and Obstetrics*, after referring to much evidence of the same nature, states:—"The evidence is adduced here in full, in order to show that the common every-day form of chronic pelvic inflammation which is met with in complication with septicæmia, is pelvic peritonitis, associated with diseased appendages, and is not pelvic cellulitis."

Now, what is the practical outcome of these recent additions to our knowledge? First, I say it is in the sweeping away of much of the *gynæcological lumber of the past*. Where we find our patients complaining of constant pelvic and reflex pains, aggravated by exertion of any kind; where we find her prematurely aged from constant suffering, her life a burden, and not only her own happiness destroyed, but that of the family circle around her, do not let us be content in cases such as these to pass a speculum or sound, and finding some erosion or displacement, rest our diagnosis upon such superficial observation, and gloss over treatment by passing a pessary or making an occasional application to the cervix. Where we find severe symptoms, we should suspect, and strongly suspect, inflammatory changes in or around the uterine appendages—changes which can only be recognised by a searching bi-manual examination, and are most certainly overlooked by the superficial examinations even still too much in vogue. Detecting these indurations, puckerings, and thickenings in the region of the posterior surface of the broad ligament, and recognising their import, there will be little fear of our treating these cases by pessaries and applications.

It may be right to note the most recent suggestions for treatment, emanating from Dr. Apostoli, by passing large currents of galvanism through the indurated tissue. Whether this method of treatment has any effect beyond the mere local cauterizing action is extremely doubtful, and it is difficult to believe that the application of galvanism in this region can have any more effect upon inflammatory products than upon inflammatory products elsewhere in the body. This is a subject to which, possibly, attention may be drawn by some member during the meetings of this section. Emmet, whose clinical observations

are of extreme value, gives us the cue to treatment in his recommendations of rest—not douches, blisters, &c.—many cases being greatly assisted by absorbent remedies, such as hydrarg. perch., potas. iodid., and bromides.

We must not, however, for one moment be so carried away by enthusiasm of our recent light, as to imagine that *a large proportion of these cases* may not be relieved by suitable medical treatment; but after most careful and systematic treatment, there will be a residuum in which medical art will altogether fail to afford relief, and here will come in this great addition to our means of alleviating suffering. Previously, looking on these conditions as due to chronic thickenings in the broad ligament—old scars, in fact, which, for some unknown reason, took an inflammatory action—we stayed our hands, and did nothing. Now we perceive, that if we succeed in removing diseased organs which are functionally useless and only foci of inflammatory action, we shall surely and certainly cure our patients.

Of the steps of the operation itself, the difficulties and complications met with, and the means of overcoming them, I do not now propose to speak; doubtless we shall have some papers dealing with these matters read before our section, when I hope to profit by the experience of many fellow-workers.

And now, gentlemen, if I have succeeded in bringing prominently before you a form of disease as common as it is overlooked; if I have succeeded in urging the necessity for more thorough and searching examinations than are at present generally adopted; if I have succeeded, even in a small degree, in clearing away some of the confusion and mystery that exists concerning the affections of the uterine appendages, the objects of my address will be attained.

PREGNANCY IN ITS VARIOUS STAGES COMPLICATED BY, OR ASSOCIATED WITH, OVARIAN DISEASE.

By T. Rowan, M.D., F.R.C.S. Ed.

The subject standing in my name, and which I have the honour to bring under your notice, is both important and practical, and at the same time happens to be one which authors and writers seem to have left very much in the background; not, I presume, because it has appeared unworthy of minute attention and thought, but probably on account of the fact that it is a condition of comparatively rare occurrence. I may mention, that I have looked in most of the standard works now in use for some information as to the proper line of treatment in cases of the kind, and have failed to get anything reliable

as a guide; and therefore, I trust that members of this branch of medical science may be able to contribute a degree of practical observation and results, which will tend to lift the subject out of comparative obscurity, and give it a prominent position amongst the numerous bodily troubles to which women are unfortunately liable. I have no desire to take up the valuable time of this Section with a long theoretical paper, as I consider such a course would be inexcusable; but I do wish to formulate my subject so that we may get all possible information for future use, without waste of time :—

(1) One of the first points to be considered when a case of advanced disease in one or both ovaries is met with during pregnancy is, whether the patient should, or should not, be left alone?

(2) And whether surgical interference should be resorted to; and if so, when?

I presume there must be a medico-legal aspect surrounding the treatment and management of cases of the kind. And as the law on the subject, if there be a law in existence, should at least be known to members of the profession, and not allowed to be unwritten as it seems to be at present, I deem it my duty to have some expression of opinion from this Section, concerning the proper course to be pursued by the medical attendant when he meets with pregnancy associated with ovarian disease.

I may mention, that I have only known of five instances of this complication, and all of them were in Victoria. One was a patient of Dr. Hillas; another was a patient of my colleague at the Women's Hospital, Dr. Balls-Headley; and the remaining three cases occurred in my own practice. In every instance but one, the patient was operated upon before the end of utero-gestation, and in every instance recovery followed; therefore, it would seem that pregnancy does not necessarily increase the rate of mortality in this class of ovariotomy. The one exception above referred to, was in the case of a patient who had a large dermoid cyst, which was not discovered until the first stage of labour was well advanced, and then it filled the greater portion of the pelvis, and by its presence prevented the head from coming below the brim. In the first two cases, one was a double ovarian, and the other single; one had advanced between three and four months, and the other about two months; one was confined at full time of a healthy female child, which weighed $7\frac{3}{4}$ lbs., and the other is not yet confined; in the one confined at full time, both ovaries were removed; and in the one not yet confined, only one was removed. In each case, the condition was diagnosed before the operation. In the first of my cases the right ovary was diseased throughout, and the left one nearly so; indeed, the wonder was as to how the patient ever managed to conceive, and the point was only settled after a minute examination of both ovaries, when it was found that a slender zone of healthy tissue still remained on the extreme lower border of the left organ. The particular kind of degeneration affecting the ovaries in this case was very peculiar, and I cannot recollect anything of a similar character in any of the cases I have seen, either in my own practice, or in the practice of any of my friends or colleagues. The new formation, which took the place of the ovarian tissue, can be likened to nothing which will more

accurately describe its appearance than frozen honey, and gave the same rough granular feel when rubbed to and fro between the forefinger and thumb. The patient was sent to me by my friend, Dr. Kennedy, of Hay; and I am indebted to Dr. Anderson, of the Women's Hospital, for the history and after-particulars of the case.

Case I.

Mrs. M., æt. 25, admitted March 9, 1888, married five months, menses regular before marriage, with only a scanty flow and no pain, have ceased now four and a half months. Felt well till Christmas 1887, when she began to feel weak and languid. About end of January, noticed a small hard lump in the left inguinal region, which has been enlarged ever since, but did not cause any inconvenience till three weeks ago; now complains of occasional vomiting for the last few weeks, absence of menses, a round hard tumour in the left inguinal region, about the size of a cocoanut, and tender—tumour is well defined, extends upwards as far as a line drawn outwards at level of umbilicus; inwards, reaches to middle line; and outwards, to the iliac crest—also a small round mass in the right inguinal region, which is very tender. From left anterior superior iliac spine, to umbilicus, is five and three-quarter inches; on right side, five inches. Per vaginam, a large hard swelling is felt on left side, between uterus and bladder, which is very tender; os uteri looks downwards and forwards, lips very soft; fundus is large and heavy.

Operation of abdominal section March 13, 1888. Both ovaries, with their Fallopian tubes, removed; non-adherent. The left was the size of a small cocoanut, and the right about the size of an orange. After the operation, the temperature never went above 100·2°.

March 18.—Bowels opened by enema.

March 19.—Deep sutures removed.

March 23.—Superficial sutures removed.

March 27.—Removed to general ward.

April 7.—Discharged cured. The uterus now reaches to within two fingers' breadth of the umbilicus; placental bruit heard distinctly, but fœtal heart sounds cannot be made out.

April 23.—Fœtal heart heard to-day; rate 134.

August 24.—Confined in the hospital, normal labour; female child, alive, weight 7¾lbs.; uninterrupted recovery, and went out. Mother and child both well on September 3.

Case II.

Particulars of this case were also kindly supplied by Dr. Anderson.

Mrs. E. K., æt. 30, had three children; last, December 30, 1887. Quite well up to this accouchment, when, on admission to the hospital, a firm tumour was felt in the pelvis, in front of the fœtal head. Dr. Rowan attempted to push up the tumour, but failing this, under chloroform, he performed podalic version, and then was able to push up the tumour and deliver. After delivery, the patient was very low and feverish at times, but is now improving.

Removed to the infirmary January 9, 1888. A tumour now is found in the left side of the abdomen, which is tender to the touch, and painful at times. It is situated in the ilio-ovarian region; is quite

hard, no fluctuation. The skin is quite movable over the tumour, which itself is freely movable, being about the size of a small cocoanut. On the right side of the abdomen a smaller tumour is felt; os uteri transverse, very patulous; fundus enlarged, soft, heavy. Left lung is dull at its base; sounds roughened, but dry, and the expansion on the left side is deficient, this arising from an attack of low pneumonia following delivery.

January 11.—Temperature, 99°. On 12th, 99·6° and 100°; thence normal.

January 13.—Some jaundice appeared to-day, and cleared off in a week.

January 17.—Some œdema of left leg, which remained till operation.

Operation, January 25; methylene by Dr. Burke. Present—Dr. Kennedy, of Hay, Dr. O'Brien, Drs. Anderson and Fetherston Jun. Usual incision through abdominal wall and peritoneum; left ovary exposed and brought to the surface; its pedicle was then transfixed, and ligatured with carbolised silk, using the Staffordshire knot; the ovary and Fallopian tube were then cut off, and the pedicle returned to the abdomen. The right ovary and its tube were treated in a similar manner. The left ovary was much enlarged, and on section was found to contain dark brown hair (same colour as patient's), and also a bony plate, but no teeth. The right ovary was also enlarged, but not so much as the left, and had some large cysts on it; section showed it to contain fatty, soft, yellowish material. The wound was closed in the usual manner, with deep silver and superficial horse-hair sutures; Keith's glass tube inserted between the fourth and fifth deep sutures; wound dusted with iodoform; absorbent wool, strapping, and flannel binders applied; ½ grain morphia suppository given, and patient placed in bed with hot bottles to feet.

Next day (January 26), temperature was 100·6°; after this, was never over 100°, and fell to normal on the 30th, and remained so. The drainage tube was removed on the 29th; bowels acted on the 31st after enema, and ol. ricini by mouth.

January 31.—Deep sutures removed; good union, notwithstanding the relaxed condition of abdominal wall through recent distension.

February 5.—Superficial sutures removed, and patient taken back to general ward.

February 10.—Abdominal belt applied, and patient allowed to get up.

February 21.—Discharged cured, well and strong.

Notes after delivery on December 30, 1887:—Temperature—30th, p.m., 103°; December 31, normal and 97·4°; January 1, 1888, 98° and normal; January 2, normal; January 3, 99° and 100°; January 4, 99° and 101°; January 5, 99·4° and 99·6°.

January 6.—Temperature, 99·8° and 103°. Some herpes appeared on face to-day; left lung is uniformly dull, poultices applied, senega and ammonia mixture given; no pain, cough, nor expectoration present, although the whole of the left lung is consolidated.

January 12.—The lung sounds clearing up very fast.

Child weighed 6½lbs. when born.

Case III.

Mrs. L., æt. 28, married three and a half years, two children, last ten months since, nursed it nine months and a week, consulted me on

July 1 last, on account of a large tumour of the abdomen, which had been steadily growing since the birth of her last child, and had given rise to much pain during the month of June, and the latter part of May. The tumour was about the size of the gravid uterus at the sixth month. The growth was slightly tender upon pressure; and, at the lower portion, presented a somewhat hard feel, and gave the impression that the cyst contained a lump of solid tissue of some kind. The uterus was enlarged and soft, and corresponded with the conditions usually met with about the first month of utero-gestation. The diagnosis was, ovarian tumour and pregnancy.

The operation was performed on August 2, and the cyst, which was dermoid, was removed. No doubt existed regarding pregnancy, as the uterus could be felt and seen through the abdominal opening. The patient made an excellent recovery, and is now expecting her confinement.

FIFTY CASES OF ABDOMINAL SECTION.

By F. C. Batchelor, M.D., M.R.C.S.E.

President of the Section.

I propose to-day to give a short report of a series of 50 cases of abdominal section, which comprise all my operations that have any bearing on the special work of this Section. Although numerically small, the series includes some cases of considerable interest and variety, to which I shall briefly draw your attention, with the object of eliciting discussion. The cases may be thus tabulated :—

Ovariotomies	18	with 3 deaths
Tait's operation	15	with 2 deaths
Oöphorectomies—		
For fibroids	4	—
For pain, cystic and cirrhosis	3	—
Hysterectomies	4	with 1 death
Laparotomy for pelvic abscess ..	1	—
Laparotomy during pregnancy ..	2	—
Cæsarian Section	1	with 1 death
Extra uterine fœtation	2	—

In all, 50 cases with 7 deaths.

In making reference to individual cases, I shall distinguish them by their numbers in my case book. The corresponding numbers will be found on the right side of the appended tables.

Amongst the ovariotomies, the first case of interest I would note was Case 12. The patient doing well for some days, when symptoms of obstruction of the bowels set in. A secondary operation was in consequence performed, and a portion of omentum, which had been stripped off the cyst-wall, was found to have formed a fresh connection, and in so doing, had tightly nipped a portion of the small bowel. The patient

never rallied from the collapse of the secondary operation. From this mishap, I learnt two important lessons :—

(1) When dividing a large heavy band, to remove or else to fix it somewhere in the abdomen out of harm's way.

(2) Not to trust blindly to opium. Had I given a free purgative on the third or fourth day, the bowel might have freed itself from the then soft adhesion.

Case 18.—The details of this operation were as simple as in any case of abdominal section I have performed, and to the best of my belief, all my antiseptic precautions were thorough and efficient ; yet, within a few hours of the operation, the patient was attacked with septicæmia, from which she died in a few days. I am at a loss to account for its occurrence, except on the supposition that the operation was undertaken too soon after delivery (on the thirty-seventh day) ; and I cannot but think that the materies morbi were stored up ready for an outbreak, and that the removal of the large ovarian tumour was but the exciting cause. It has since made me chary of operating upon a patient while still in the puerperal period.

Case 20 was an excessively rare one. The patient was sent into the hospital, supposed to be suffering from an ovarian tumour, which on three occasions previously had been tapped of many gallons of fluid. On admission, she was suffering from an enormous tumour, filling the abdomen, with usual lines of ovarian dulness. On opening the abdomen, a large white cyst-wall presented, which was tapped of several gallons of darkish fluid. The lower portion of the tumour was cleared with much difficulty, and a large thick pedicle secured. On attempting to free the upper portion of the tumour, it was traced deeply into the abdomen, and was adherent loosely to the cellular tissue of the loin in front, and at its upper portion it was covered by peritoneum. After separating most extensive adhesions, the whole sac was at length removed, and presented about its centre a constriction—apparently dividing the tumour into two large lobes, though both communicated freely. Even after complete removal of growth, considerable doubt existed as to its true nature. From its deep pelvic connections ; from the absence of the left ovary, which was searched for at operation, but could not be found ; from the facts, that the lower portion of the sac, which first came into view on opening abdomen, had no peritoneal covering, and the descending colon being displaced to the left, an ovarian origin was indicated. But the tumour's deep connections in the loin, reaching up to the diaphragm ; the situation of the upper part of the growth beneath the peritoneum, and the absence of the left kidney, pointed more to a condition of hydronephrosis. The patient never rallied from the operation, but died collapsed on the fifth day.

Dr. Roberts, our pathologist, found the left kidney and left ovary absent at post-mortem examination. The conclusion therefore arrived at was, that the ovarian tumour being closely adherent to the pelvic walls, in its earlier growth, had so pressed upon the ureter as to cause its obstruction, and consequent hydronephrosis. By the two sacs meeting and pressing together, the party wall had become obliterated, and resulted in the formation of one large cavity. I only remember reading of one similar case, reported recently by Mr. K. Thornton.

Case 50.—This patient was a woman,.who gave her age as 62 years, but probably older. On opening the peritoneum, the whole abdomen was filled with layers of jelly-like material, which dipped between the bowels and different viscera. On clearing away some of the surface jelly, a white ovarian cyst was found, with a large rent, through which the colloid material had escaped into the general peritoneal cavity.

In Case 65, a similar accident had occurred, the peritoneal cavity being filled with colloid material, considerably modifying the ordinary lines of resonance on examination prior to operation.

In both these cases, the syphon trochar recommended by Lawson Tait was employed, and acted most efficiently—gallons of hot water were thus syphoned into the peritoneal cavity, block after block of glutinous jelly-like material floated up out of the wound, until the peritoneal cavity was thoroughly cleared out. Both these patients made most satisfactory recoveries.

Another point to which I would draw your attention in this list of ovariotomies, is the frequency with which more or less abundant traces of dermoid materials were observed—in seven of the eighteen cases was dermoid matter distinctly present.

Those who are interested in the subject, and have not read an article in the last number of the *Gynæcological Journal*, by Bland Sutton, on the "Origin of Ovarian Dermoid," will find it well worthy of careful perusal. In it, he points out :—

(1) How multilocular, ovarian, and dermoids, originate in Graafian follicles.

(2) How frequently dermoids are associated with multilocular ovarian tumours.

(3) How transitional stages can be traced from the membrana granulosa—the lining membrane of the follicle—to mucous membrane; then to mucous glands, of which multilocular ovarian are composed; then that skin and mucous membrane are fundamentally identical. Skin covers the exterior of the body, has sebaceous glands, and is furnished with hair; and if a complex cyst, such as a multilocular ovarian, can arise from a Graafian follicle, surely we cannot deny the origin of an ovarian from the same source. In this manner, accounts for ovarian dermoids in a much more satisfactory manner, than by the vague hypotheses formerly held.

Under the heading, "Tait's Operation," are classed cases where the Fallopian tube presented some marked inflammatory change, where this inflammation had extended to the neighbouring peritoneum, and where the ovary was more or less bound down by adhesions. The operation for the removal of these diseased appendages has been by far the most difficult I have performed within the abdomen. Throughout the operation, one has to depend solely upon the sense of touch. The relations of parts are often much altered, the structures themselves changed often beyond recognition, the ovary more than once entirely shut off by layers of exudation.

The result of my cases has proved to me, what an immense amount of manipulative interference the peritoneum will stand, provided no

visceral injury is inflicted. The incision through the abdominal walls, in these cases, must be made with much more care and deliberation than where the abdomen is distended by a large cyst. More than once have I found the peritoneum beneath the line of incision, thickened and adherent to underlying structures. The fundus uteri, which is generally taken as a guide to identify the tubes, was in Case 55 so surrounded by adhesions to neighbouring bowel, that it was with difficulty reached; the adhesions of the tubes and ovaries to surrounding structures are often so dense, that considerable force has to be employed to separate them; and more than once I have feared a rupture would occur into the neighbouring viscera, or that some of the main vessels would be torn.

In Case 40, such a rupture into the bowel did occur; and a subsequent post-mortem showed several points of ulcerative communication between an enlarged caseating cavity in the Fallopian tube and the descending colon.

In both cases of this operation that terminated fatally, the disease in the tube was tubercular. In Case 40, the general peritoneal cavity was inoculated throughout; the tubes were converted into large caseating masses, and the left had formed adhesions so dense and extensive, that the attempt to remove it had to be abandoned; and even at post-mortem it was found impossible to remove diseased portions, without actually stripping the whole of the left and posterior part of the pelvic cavity of its contents. Even here, however, the broad ligament could be identified, displaced and covered by adhesions, but no thickening or deposit existed between its layers. In my second fatal case, No. 56, some rupture into the urinary passages must, I fear, have occurred during operation. The case was one of old standing; the adhesions were unusually tough and dense, their solid irregular feel having led to a diagnosis of cancer by the gentleman who had forwarded the case to me. Blood was drawn off with the urine; following the operation, peritonitis and collapse ensued; the abdomen was drained, but no improvement followed, the patient dying on the third day. Dr. Roberts made sections from the diseased tissues, and found typical giant-cells of tubercle.

In Case 54, the adhesions between the right Fallopian tube and the bowel were most intimate, and required most careful dissection for its removal; and if it had been permitted to run on, a communication between the two must shortly have occurred.

Reviewing this class, I should say that the operation is severe proportionately to the nature and extent of the adhesions. The symptoms to which the disease gives rise are also severe, and often render invalid, or eventually even cause death. Operative measures give the only prospect of relief, especially to that class of patients to whom the struggle for existence renders work imperative. The risks of the operation itself should be by no means greater than other operations performed for less serious conditions. It is an operation we therefore hail as a great addition to our resources, and the greatest advance in modern Gynæcology.

Oöphorectomy has been performed for two different conditions:—

(1) To arrest growth of fibroid tumours.

(2) For severe ovarian pain, causing marked reflex disturbance.

Oöphorectomy, for arresting growth of fibroids, is not so easy as one might at first sight imagine. The fibroid is often twisted on its transverse axis ; the position of the ovary difficult to discover, especially through a small abdominal incision ; the pedicle is very short, and difficult to drag into the wound, and the veins of the broad ligament enormously dilated ; although I have not lost a patient.

Case 25 had an attack of phlegmasia dolens following operation, which retarded recovery. In all four cases, the growth of the tumour has been arrested.

In Case 16, the hæmorrhage, a troublesome symptom, continued as severe as ever, when I last heard of the patient.

In Cases 25 and 33, the hæmorrhage was arrested, and the tumours decreased remarkably in size. In Case 25, although prior to operation the summit of the tumour reached two inches above the umbilicus, eight months subsequently, the outlines could only with difficulty be made out immediately above the symphysis.

Case 28.—The fibroid was small, and tending to grow towards the right side of the pelvis. The menorrhagia was effectually controlled, but the patient's condition has been rather aggravated than improved by the operation, so severe have been the climacteric disturbances. For twelve months, flushings, headache, and general debility were the chief complaints. Latterly, palpitation and polyuria, amounting to twenty pints a day, and other sympathetic disturbances.

On the whole, I am not satisfied with the results of these operations for arrest of fibroid ; and from a somewhat limited experience of the Apōstōli method, by large doses of galvanism, should certainly give it a trial before resorting to oöphorectomy, or severer measures.

With regard to oöphorectomies for persistent and severe ovarian pain, I must honestly confess that, with these cases, I have always felt myself treading on dangerous ground. I have avoided operating in a good many cases where some surgeons have considered the indications sufficient to justify this radical measure. My difficulty has been in determining where the subjective symptom (pain) is due to a change which, by examination, gives no physical sign, and those cases where pain is merely an indication of some general nervous condition, localised specially in the ovary by some morbid concentration of the mind on the generative organs ; or some slight local irritation which, with a more healthy state of the nervous centres, would not cause any appreciable disturbance.

In the few cases where I have removed ovaries on account of pain, I have failed to find sufficient change to account for the symptoms. I entertain the gravest doubts as to the *rôle* that slighter form of cystic conditions play, as a factor in the production of symptoms. I have more than once seen an ovary containing cysts in abnormal quantity and size, without giving rise to any symptom whatever. In the early stage, too, of the ordinary forms of cystoma, there is, more frequently than not, an entire absence of pain. When we perform an operation which mutilates and destroys one of the most important functions of womanhood, I must admit, that I am materialistic enough to expect to find some change marked, evident, and ready of recognition by the naked eye ; and that the same rule must apply to the ovary, as to any other important organ in the body, viz., that before removing it, it

must be hopelessly diseased, and the changes gross and characteristic. Until, however, we obtain a closer insight into the histology and pathology of the ovary, we must expect to find radical differences in opinions and practices.

In Case 49, when I removed a prolapsed right ovary, which contained cysts in excess, it would have been better practice to have fixed the ovary in normal position, and not removed it entirely, as I did.

In Cases 53 and 54, excessive cystic formations were present in the ovaries. The pain, constant and persistent in one case, was entirely removed; and in the other, the reflex ocular disturbance entirely subsided, but the conjecture must arise—had these patients' social surroundings been different, had they been in a position to undergo a course of Weir Mitchell's treatment, or had they become pregnant, might not the results have been equally good, and at a less cost. The operation for removal of cystic or cirrhosed ovaries is by far the simplest in abdominal surgery; and it is hardly fair to class these cases with Tait's operation, where one frequently meets difficult and dangerous complications, and where there must be a much heavier mortality. The mere fact of the operation being so easily performed, and being attended by so little danger, renders it a measure specially liable to become abused.

The two cases of extra uterine fœtation, I have already reported in full.

No. 14 was at the earlier month of pregnancy, and the cyst had apparently ruptured between the layers of the broad ligament.

No. 19.—The pregnancy was probably originally tubal, and had burst as usual about the third month into the general peritoneal cavity. The fœtus continued to develop till term; its death occurred, and for some twelve months it remained in the abdominal cavity, without causing any disturbance. Communication then occurred between the sac containing the fœtus, and the bowel, and decomposition set in, with symptoms of septic absorption. By operation, a decomposing fœtus was removed. Both these cases made satisfactory recoveries.

Laparotomy, during pregnancy, was twice performed:—

Case 4, was removal of a cyst (hydatid) from the under surface of the liver, by an incision on the outside of the right rectus muscle.

Case 21, was a case of strangulation of the bowel, from bands; the patient was almost moribund during operation—a most desperate case. Both patients made most satisfactory recoveries. Pregnancy in each case had advanced to between the third and fourth month; in neither was its normal course interfered with. Both were delivered at full term of healthy children.

Hysterectomy was performed in four cases:—

Case 15 was a moderate-sized tumour of slow growth, causing severe menorrhagia. The fundus uteri reached to the cartilage of the ribs on the right side; the adhesions were numerous and tough. An interesting point in connection with this case is that, when first admitted into the hospital, the tumour was diagnosed malignant, on account of œdema of the legs, ascites, and a large effusion in the right pleural cavity. The chest was tapped, and the patient left the hospital relieved. Six months

subsequently, she was re-admitted, on account of the increasing size of the abdomen; and as her general health had in no way deteriorated, and there was no reappearance of the pleuritic effusion, I determined to make an attempt to remove the growth, which I succeeded in doing, treating the stump by Kœberle's clamp. The patient made a good recovery.

Case 22.—An enormous fibroid, distending the whole abdomen, and causing anæmia, from menorrhagia and constant irritating watery discharge. Drugs had no effect, and intra-uterine dilatation and applications failed to arrest hæmorrhage. The entire uterus and appendages were therefore removed, and the extra-peritoneal stump clamped, as before. The patient made a thorough recovery, though for many days her life hung in the balance. A free purgation, finally, I think, determined matters in her favour.

Case 35.—A particularly distressing one. A young woman, æt. 28, only confined of her second child a few months previously, developed malignant disease in the uterus, which must have rapidly involved the whole organ. When I first visited her, she had only complained six weeks, yet there was a large fungating mass protruding through the cervix. The body of the mass was irregular and nodular, and infiltration was evidently extending in the broad ligaments. A microscopic examination of a section from cervical tissue showed alveolar structure of scirrhus, and consequently it was determined to make an attempt at removal. In consequence of the broad ligament being involved, it was determined to operate through the abdomen. The mischief was found to be even more extensive than had been anticipated; the whole uterus, a great portion of the broad ligament, the Fallopian tubes, and ovaries, requiring removal. The stump of the broad ligament was ligatured, the abdominal wound closed, and a large drainage tube inserted through the vagina. The patient for three days suffered severely from shock, but subsequently made a truly remarkable recovery in ten days, being freer from pain and in better health than she had been prior to operation, there being an entire absence of any constitutional disturbance. The disease, however, rapidly recurred; and shortly she succumbed, large masses of cancer blocking up the pelvis. It is somewhat remarkable, that six months previously, I had removed an ovarian tumour from this patient's sister.

Case 51.—One of the most interesting cases I have met with in abdominal surgery. The patient, aged 22, a strong, muscular woman, was admitted into the Dunedin Hospital with a history of a miscarriage at the fourth month, two weeks previously. Since then, she has been excessively ill, losing flesh, unable to take food, confined to bed, and suffering heavy losses of blood. On admission, the patient was blanched, suffering from metrorrhagic discharge, with an irregular temperature and quick pulse. The uterus was felt enlarged to the level of the umbilicus, hard, and excessively tender.

In consequence of the history of miscarriage, it was considered probable that there were some placental remains in the uterus; and consequently it was dilated and its cavity examined, but nothing was discovered beyond the fact of its being too large, and though the whole finger was introduced, it did not reach to within an inch or more of the fundus. After this, the metrorrhagia ceased, but the abdominal

tenderness, fever, and constitutional disturbance continued. The anæmia became daily more marked, and it was suggested that we were dealing with a case of pernicious anæmia. An examination of the blood showed the red corpuscles irregular in outline, deficient, and large quantities of granular matter, and small corpuscles. By abdominal palpation, the tumour was found to be increasing in size, the bulging being especially marked on the right side, whereas the sound passed to its greatest depth towards the left. On visiting, one day, it was found that the outlines of the tumour—which had been carefully mapped out with aniline the day previously—had made a very remarkable increase in all its dimensions, and the margins were softer and less defined. The patient's condition was worse, being more anæmic than ever; it was thought that possibly there might be some hæmatic effusion. A needle was passed on several occasions for diagnostic purposes, but gave no further information. An exploratory incision was therefore made. On getting through the abdominal walls, the sub-peritoneal fat was œdematous; the peritoneum itself thickened; on opening it, semi-opaque fluid spirted from the opening, and a firm fleshy tumour came into view, part covered by flakes of lymph, part by a greyish exudation, and part black and gangrenous-looking. To the summit and posterior portion of the tumour were attached neighbouring bowel and omentum, in separating which, several separate accumulations of fluid were opened—some consisting of clear serous, some semi-purulent, and some purulent fluid. After clearing the whole mass, we found that the portion to the left consisted of a large sub-involuted uterus, while springing from its right side was a sloughing semi-gangrenous fibroid, larger than a good-sized cocoanut.

It was evident that the woman's only chance lay in removing the sloughing fibroid, and with it the uterus. This condition not having been anticipated, I was not prepared with the clamp I have previously used in my hysterectomies; and therefore adopted the plan of clamping the broad ligaments separately by long forceps, and then amputated the uterus close to its neck by a circular flap, taking care to cut the exterior layer of uterine tissue at a higher level than the inner. Smart bleeding occurred from some vessels at the root of the broad ligament, which had not been included in the clamp, but it was quickly arrested by application of Spencer Wells' forceps. The tissues of the stump of the broad ligament were then separately ligatured, and all bleeding controlled. The uterine stump was united by double layers of suture—the deep taking a good grip of the muscular wall, and the superficial including only the peritoneal tissue—a very good stump was thus obtained. After freely syphoning the peritoneal cavity, and inserting a glass drainage tube, the abdominal wound was closed.

For the first week, all went well; little discharge coming from the drainage tube, and temperature and pulse improving. Then symptoms of intestinal disturbance arose—flatus, vomiting, and twisting pain in the bowels. The upper part of the wound, two inches above opening for drainage tube, became distended and hard, and here I had to make a counter opening, evacuating pus in large quantities, and subsequently bowel matter. A cavity formed here as large as a small orange, the floor being formed by convolutions of the bowels, in one of which a

circular opening existed, through which the intestinal contents discharged. This opening was evidently high in the intestinal canal, as food escaped through it almost as taken by the mouth. The patient gradually sank.

At post-mortem, two feet of the small bowel was found to have become invaginated; the intussusception had started by a portion of the bowel being constricted by adhesions, the result of the previous purulent peritonitis, and sinking within and becoming strangulated by a larger and more patulous portion. The sudden enlargement in the outline of the tumour was probably due to the œdematous state of the peritoneal tissues surrounding it, and possibly also to exudation in the tumour itself.

In this case, a purgative was administered on the fifth day, which I have since regretted, as it may have had some influence in producing the intussusception, and it was unnecessary, as the peritoneum was well drained.

Case 43.--This case of Cæsarian section opens a very large subject. The patient, a primipara, æt. 32, had been in labour three days; the os had been fully dilated, and the membrane ruptured many hours.

On visiting her, in consultation with Dr. Roberts, I found the patient a stout muscular woman, who was evidently becoming exhausted. The vagina was dry, rigid, and undilatable; the os was high, the pelvic cavity being very deep; it was only by introducing part of the hand that the presentation could be determined. Forceps had been applied, and re-applied, and failed (brow and hand). The uterus was in a state of tonic irritable contraction. An attempt was made to turn, but utterly failed. It was impossible to convert the case into vertex. Chloroform was administered to deep anæsthesia, but no relaxation of the uterine walls ensued. Our choice lay between craniotomy, which with rigid undilated vagina and deep pelvis would be an exceedingly difficult and prolonged operation; and in patient's weak state, dangerous, involving much laceration of soft parts; or Cæsarian section, which we considered finally would give a little chance.

The operation was performed on a table, in as good a light as we could command, in a small room. The uterine wall was freely incised, keeping away from cervical portion. The child was so tightly gripped by the uterus, that in incising the uterine wall, we also scored the skin of the child's back. The child (dead) was extracted with difficulty. Hæmorrhage from the placental site was quickly arrested, but a large sinus from the lower part of the uterine wound bled profusely, and was the cause of much delay in closing the wound. Deep muscular and superficial peritoneal sutures closed the uterine incision. The patient never rallied from the operation, but died shortly after removal to her bed.

Now to make a few references to the steps of the operation itself, in addition to the preliminary preparations usually recommended. In all cases where I have to open the abdomen, and expect to find changes in the pelvic organs, immediately prior to operation the vagina is rendered aseptic by thoroughly washing out with strong tincture of iodine in solution with hot water. In cases of difficulty, I have gained much by passing one or two fingers into the vagina, while the fingers of the other hand work in the abdominal cavity. When the tubes and ovaries

are much bound down by inflammatory products, the assistance thus gained is immense, and but for this manœuvre, I should have been unable to complete several cases of Tait's operation.

In making my incision through the abdominal walls, I always avoid dissecting the tissues as far as possible; the first cut usually divides skin and fat down the muscular walls, the second divides the sheaths of the muscles for the length of the wound. On reaching the sub-peritoneal fat, especially in cases where there has been peritonitis, I find it necessary to be exceedingly careful, much more so for oöphorectomies than when dealing with large cysts. To divide the sub-peritoneal fat cleanly, a very sharp knife is required, otherwise it slips under the blade, and the fat is notched and jagged irregularly, which interferes with the subsequent kindly healing. As soon as I have opened the peritoneal cavity sufficiently to admit the finger, I trust to it rather than to directors (from non-observance of this rule, I once saw an operator seriously injure an adherent coil of bowel).

For emptying a cyst, I now always incise freely with a sharp-pointed bistoury, turning the patient on her side before so doing, and directing one of my assistants to seize the cut and gaping edge with strong catch forceps. I prefer this infinitely to tapping with a trochar—the latter, being often blunt, fails to penetrate a thick cyst-wall cleanly; the cyst often tears near the trochar, and permits an escape of fluid; the tubing is apt to kink, or get clogged, if contents of cyst are thick, if a multilocular cyst is being dealt with. To open secondary cysts satisfactorily, one must eventually, in most cases, open cyst-wall sufficiently to introduce the finger and feel for projecting cysts. For ligature of stump, I employ the Staffordshire knot, as advised by Lawson Tait. If thick silk is used, it should be well saturated with wax, or otherwise it will fail to run freely, and causes trouble.

The syphon apparatus, recommended also by Lawson Tait, I have found invaluable in several cases. Where colloid material has escaped freely into the peritoneum, it would have been simply impossible to have cleaned that cavity effectually, without employing some such measure. With a large tube, the peritoneum can be flushed with gallons of water in a few minutes; colloid material floats out of the wound; much time is thus saved. It avoids a large amount of sponging and manipulating within the peritoneum, and one can do with far fewer sponges. I have several times completed an ovariotomy, and employed only two or three sponges throughout. It is a mistake to have too many sponges in use; they are apt to get mislaid amongst the patient's coverings, or in dirty solutions, and at completion of operation cannot be found. I always have a supply ready, but direct the assistant not to use more than is absolutely required.

For sutures for abdominal walls, I use strong silkworm gut, and include the whole of the tissues of abdominal walls; they are more easily removed than silver wire, and are equally clean and strong, and will remain for months in the wound without dissolving.

The necessity for carefully counting sponges and forceps, prior to closing the wound, has more than once been unpleasantly brought home to me. Once, after a severe and difficult operation, I neglected this usual precaution, and on getting my instruments home, found a forceps missing. I had almost decided to return and open the wound, when

on enquiry of the gentleman who had administered the anæsthetic, I found he had inadvertently enclosed it in the bag with his anæsthetic apparatus.

I employ very simple dressing for the wound. After adjusting sutures and drying surface, it is freely dusted with a powder, composed of one part of finely powdered iodoform with four of amorphous boracic acid. A light layer of absorbent or alembroth wool is laid on this; a broad strip of strapping, which encircles the fourth of the body, keeps this in place, and supports the wound in case of vomiting. A large pad of absorbent tow covers the whole abdomen, and a many-tailed bandage is applied over all.

When possible, I do without drainage tubes. The proper place for draining of the peritoneum is, I consider, the posterior vaginal fornix. In the majority of my cases, the patient is advised to pass her water without the assistance of the catheter.

A few hours after operation, if the patient prefers it, she is allowed to lie partially over on her side, supported by a pillow along the spine. On the third or fourth day following operation, a purgative is generally administered, especially if there is a foul breath, furred tongue, vomiting, persistent distension, or other sign of abdominal disturbances. Opium, if possible, I carefully avoid; some administer this drug as a mere matter of routine; some immediately any symptoms of peritonitis are apparent. There seems to me little likelihood of this drug being of any use in the form of peritonitis we most dread after operation in the abdominal cavity, viz., purulent peritonitis; and my impression is, that the strong recommendation of the administration of opium, in the treatment of pure peritonitis, depends upon a confusion of ideas and expressions. Peritonitis, as met with in general practice, almost invariably depends upon pre-existing visceral lesions, and for such visceral lesions opium stands pre-eminent amongst drugs; but it is illogical to argue that it is of equal applicability in peritonitis, independent of such visceral complications. In fact, in dealing with a pure peritonitis, my belief is that opium does much harm by masking symptoms, and rendering adhesions, when they do form, more dangerous.

Vomiting has always been my greatest trouble amongst minor complications. I know of nothing that I can depend upon for its relief. As a rule, for two days no food is administered by the mouth. A little scalding water, sipped now and again, is all I generally allow. Ice is avoided, as it induces thirst. Occasionally, when there is much shock, an injection of morphia will temporarily allay sickness.

No. in Present Series.	Date.	Name.	Age.	Nature of Disease.	Operation Performed.	Result.	No. in Case Book.
1	1881 Nov. 20	M. M.	41	Unilocular ovarian cyst; large.	Removal.	Cure.	2
2	1882 April 18	E. C.	33	Old-standing pelvic abscess.	Mesial laparotomy; drainage.	Cure.	3
3	May 7	E. J.	34	Hydatid cyst of liver; small. Pregnancy $3\frac{1}{2}$ months.	Lateral laparotomy exterior to right rectus muscle. Removal.	Cure.	4
4	Sept. 1	M. K.	30	Sarcoma of both ovaries, with omental deposits (size of cocoa-nuts).	Mesial laparotomy. Removal.	Cure.	5
5	1883 July 10	N. H.	33	Ovarian cyst, multilocular; large.	Removal.	Cure.	11
6	Nov. 25	M. H.	28	Ovarian dermoid, slow growth, many years; enormous size.	Removal. Acute strangulation of bowel from bands; secondary operation.	Death.	12
7	1884 Jan. 24	L. L.	32	Dermoid ovarian cyst; medium size.	Removal.	Cure.	13
8	Aug. 11	M. K.	35	Extra-uterine fœtation; early months.	Removal of clot and sac wall.	Cure.	14
9	Sept. 11	M. B.	27	Fibro-cystic tumour of uterus, reaching much above umbilicus.	Removal by Kœberlé's clamp.	Cure.	15
	1885	—	—	Absent in Europe.	—	—	—
10	1886 Feb. 2	M. S.	30	Fibro-myoma and menorrhagia.	Oöphorectomy and salpingotomy.	Cure.	16
11	July 29	S. M.	26	Ovarian cyst; very large, with solid stump.	Removal 37 days following delivery. Septicæmia.	Death.	18

No. in Present Series.	Date.	Name.	Age.	Nature of Disease.	Operation Performed.	Result.	No. in Case Book.
12	Oct. 14	C. W.	38	Extra-uterine fœtation. One year past full time. Fœtus decomposing.	Removal by abdominal incision and drainage of cyst.	Cure.	19
13	Oct. 28	J. C.	44	Left hydro-nephrotic and ovarian cysts, communicating.	Both removed.	Death.	20
14	1887 Jan. 2	M. H.	27	Obstruction, followed by strangulation of small bowel by bands. Pregnancy 3½ months.	Division of bands.	Cure.	21
15	Jan. 19	S. H.	40	Menorrhagia, metrorrhagia; sero-sanguineous discharge; fibro-myoma size of full pregnancy.	Hysterectomy. Kœberlé's clamp.	Cure.	22
16	Feb. 18	M. H.	39	Diseased appendages, result of inflammation.	Tait's operation.	Cure.	23
17	April 20	A. R.	24	Ovarian tumour, multilocular; size of full term pregnancy.	Removal.	Cure.	24
18	June 9	J. C.	36	Fibro-myoma of uterus; menorrhagia.	Oöphorectomy.	Cure.	25
19	Sept. 13	M. H.	20	Multilocular ovarian; large size.	Removal.	Cure.	26
20	Oct. 4	M. S.	34	Small lateral pelvic fibro-myoma; hysteria gravior.	Oöphorectomy.	Cure.	28
21	Nov. 1	M. F.	27	Diseased appendages; tubercular.	Tait's operation.	Cure.	32
22	Nov. 3	E. J.	38	Fibro-myoma, growing; menorrhagia.	Oöphorectomy.	Cure.	33
23	Nov. 3	M. M.	40	Malignant disease of both ovaries.	Double ovariotomy.	Cure.	34
24	Nov. 6	M. O.	28	Cancer of uterus and appendages.	Removal of uterus, ovaries, and infiltrated ligaments and tubes. Abdominal incision.	Cure.	35

No. in Present Series.	Date.	Name.	Age.	Nature of Disease.	Operation Performed.	Result.	No. in Case Book.
25	1883 Jan. 29	J. H.	27	Ovarian tumour, enormous, multilocular; extensive and general adhesions; rapid increase in size, following delivery.	Ovariotomy.	Cure.	38
26	March 1	C. K.	30	Diseased appendages; inflammatory.	Tait's operation.	Cure.	39
27	March 1	L. Y.	23	Diseased appendages; tubercular; general tubercular peritoneal deposit.	Removal of right tube and ovary; left abandoned.	Death.	40
28	April 10	S. W.	30	Diseased appendages; inflammatory.	Tait's operation.	Cure.	41
29	April 20	M. B.	37	Diseased appendages; pyo-salpinx; gonorrhœal.	Tait's operation.	Cure.	42
30	April 21	—	33	Difficult and prolonged labour; mal-presentation; tetany of uterus.	Cæsarian section.	Death.	43
31	May 1	J. J.	38	Diseased appendages; inflammatory.	Tait's operation.	Cure.	44
32	May 7	A. J.	21	Multilocular ovarian; large. Patient suffers from contracted mitral disease.	Removal.	Cure.	45
33	May 16	E. S.	40	Diseased appendages.	Tait's operation.	Cure.	46
34	May 27	J. C.	62	Multilocular ovarian; ruptured cyst; colloid escape.	Removal.	Cure.	47
35	June 14	A. E.	23	Right ovary prolapsed, tender, and seat of constant pain; dysmenorrhœa.	Removal.	Cure.	49
36	July 12	M. C.	42	Ovarian tumour, dermoid contents; large.	Removal.	Cure.	50
37	July 19	L. D.	28	Diseased appendages.	Tait's operation.	Cure.	51

No. in Present Series.	Date.	Name.	Age.	Nature of Disease.	Operation Performed.	Result.	No. in Case Book.
38	July 23	A. D.	22	Sloughing fibro-myoma; purulent peritonitis; septicæmia.	Hysterectomy; intus-susception of the bowel.	Death.	52
39	Aug. 7	M. J.	23	Ovarian pain, severe and constant; reflex eye troubles.	Oöphorectomy.	Cure.	53
40	Aug. 9	A. B.	24	Ovarian pain; optic neuritis; prolapsed ovary, left.	Oöphorectomy.	Cure.	54
41	Aug. 22	E. P.	27	Diseased appendages; constitutional symptoms unusually severe.	Tait's operation.	Cure.	55
42	Sept. 13	M. O.	33	Diseased appendages; tubercular; simulating malignant disease.	Tait's operation (injury to ureter?)	Death.	56
43	Oct. 19	M. B.	23	Diseased appendages; gonorrhœal.	Tait's operation.	Cure.	57
44	Oct. 18	E. M. E.	32	Diseased appendages; inflammatory.	Tait's operation.	Cure.	58
45	Nov. 2	J. D.	35	Ovarian tumour, large; some dermoid material.	Removal.	Cure.	60
46	Nov. 8	J. W.	34	Diseased appendages.	Tait's operation.	Cure.	61
47	Nov. 11	A. T.	33	Diseased appendages; treated for years for chronic cellulitis.	Tait's operation.	Cure.	62
48	Dec. 6	M. J. R.	52	Ovarian tumour, multilocular; most intimate adhesions to bladder, &c.	Removal.	Cure.	63
49	Dec. 11	M. S.	55	Ovarian tumour, multilocular.	Removal.	Cure.	64
50	Dec. 20	J. M'L.	32	Ovarian tumour, multilocular; ruptured cyst.	Removal.	Cure.	65

TWO CASES OF EXTRA-UTERINE PREGNANCY, SUCCESSFULLY TREATED BY ABDOMINAL SECTION.

By Ralph Worrall, M.D., M.Ch.

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At the present time, no subject in Gynæcology is more energetically discussed than that of ectopic gestation. I have, therefore, thought the record of two cases a not unworthy subject to bring before this Congress.

The first case was that of Mrs. W., æt. 33, married fifteen years, four children, last in January 1887. This labour was difficult, and convalescence slow. A slight red discharge appeared off and on for three months afterwards, and then completely ceased. About seven months after confinement, she noticed a small lump in the right inguinal region, which was painful on exertion. She felt queer, but did not know whether to consider herself pregnant. She was nursing the baby, and, therefore, was not surprised at the absence of her monthly periods.

On September 27, whilst washing, felt a sudden severe pain in the small tumour, and spreading from there all over the abdomen, causing her to faint. She was carried to bed, and revived by brandy. In about two hours vomiting set in, and the faintness passed off; but the pain continued to be very severe.

The patient was first seen by me on the following day, September 28, and then presented the local and general signs of acute peritonitis. Bimanual examination disclosed a tender fluctuating swelling, projecting into the right vaginal fornix, displacing the uterus forwards and to the left, and reaching above nearly to the umbilicus. For the next five days there was no change in her condition, except that the acuteness of the attack passed off, and with it the vomiting.

On October 5, seven days after the sudden attack of pain, there was a considerable discharge of blood from the uterus, containing shreds of decidua-like membrane. This continuing, the following day, after consultation with Dr. Chambers, I dilated the cervix with Hegar's dilators, and curetted away a great quantity of decidua. The sound passed $4\frac{1}{4}$ inches. Hæmorrhage followed this procedure so profusely, that it could only be controlled by injecting a solution of perchloride of iron (1 in 20). Collapse was marked, and for twenty hours the pulse kept at 160. It gradually resumed its previous rate of 120, the temperature ranging about 101°. There was no more bleeding after this, but the general condition remained unchanged. There was much sweating, and progressive loss of flesh, but no pain nor shivering. The tumour gradually increased in size, and on October 27 was noted to have extended to two inches above the umbilicus, and to have crossed the middle line for a like distance.

On November 2, ether was administered by Dr. Jenkins, and assisted by Dr. Chambers, I performed abdominal section. The parietes were highly vascular, and, to the right of the middle line, the cyst was

found to be universally adherent; to the left, it was free. With the aspirator I drew off about two pints of dark grumous-looking fluid, which subsequent examination showed to have a specific gravity of 1020, and to be highly albuminous. The microscope showed a few red corpuscles; others, which were similar to white or pus cells, and much granular matter. The cyst was incised, and its margins stitched to the edges of the abdominal wound. On exploring the interior with the finger, a body the size of a small hen's egg was found engrafted on the lower wall; it fluctuated, and when incised appeared to contain similar fluid to that in the cyst. A drainage tube was inserted, and the wound closed in the usual manner. Recovery was very slow, the patient being confined to her bed for two months. Sanious pus and necrosed tissue continued to discharge from the cyst, so that I was unable to remove the tube until the end of the third month. At the present time she is in good health, and menstruates normally.

It will be noticed, that no fœtus was found, and therefore it may be contended that this was not an instance of extra-uterine pregnancy at all; if, however, the case be viewed as a whole, I think it will be admitted that the diagnosis was warranted by the facts.

I base my opinion, more particularly, on the detection by the patient —who was very spare—of a small lump; on her feeling so, that she was led to suspect pregnancy; on the sudden attack of agonising pain, followed immediately by collapse, and later on by peritonitis, with discharge of blood and shreds of membrane; and on the enlargement of the uterus, with formation of decidua.

The second case (Mrs. H.), I saw in consultation with Dr. Power, on January 11th, 1888. She gave the following history:—Æt. 28; married nine years, two children (last seven years ago), no miscarriages, menstruation had been regular and health good up to eight months before; she then missed a period, and thought herself pregnant; the flow, however, appeared a week later, and lasted two weeks. It was regular every month after this until the last two months, during which there was again a break, while for the last two weeks there had been a profuse discharge. From the time the menses first ceased, she was troubled with pains in the lower abdomen and occasional vomiting, which culminated during a period, four months before I first saw her, in an attack of agonising pain, followed by collapse. Her usual medical attendant was hastily summoned, and administered morphine hypodermically. Repeated doses in the course of twenty-four hours subdued the first violence of the pain; but since then, she had been more or less confined to bed. About three months ago, she noticed "pieces of flesh" coming away with the menstrual flow; milk also appeared in the breasts, and she felt what appeared to be movements. She consulted one of the leading surgeons in Sydney, who told her she was pregnant, and this assurance satisfied her for a time. Becoming alarmed however at her increasing weakness, with occasional shivers and profuse night sweats, she called in Dr. Power, who asked me to see the case. We found her much emaciated. Temperature 101°, pulse 112. Tongue dry. Abdomen hard, distended, and moderately tender. In the hypochondriac and right inguinal regions, extending nearly to the umbilicus, could be distinguished a tense cyst. Per vaginam, the cervix had somewhat the soft feel of pregnancy, the uterus

was firmly fixed, and the vaginal vault hard and tender; the sound passed to the left three and a quarter inches. Taking these physical signs in conjunction with the foregoing history, there was little difficulty in arriving at the conclusion, that we had to deal with a case of ectopic gestation. The patient's means not allowing of home treatment, she was admitted into the Sydney Hospital, and on January 19 I opened the abdomen in the middle line. On raising the omentum, which was extremely vascular, the cyst, which had been felt through the parietes, was found to be the right broad ligament distended with fluid, and containing in addition some hard body. It was, to a large extent, adherent to surrounding parts, and over its surface ramified several enormous vessels. With the aspirator, I drew off sufficient stinking pus to relieve the tension; I then incised, and extracted, in pieces, a putrid fœtus of about the fifth month. Every precaution was taken to prevent contamination of the peritoneum, and all pus having been removed from the cyst with the syringe, its edges were stitched in the abdominal wound. The placenta was left undisturbed. A large drainage-tube was inserted, and the cyst syringed out with warm carbolic lotion three times daily. From the third day, small pieces of placenta, loosened by the syringing, were removed by forceps; and on the twelfth day, the entire mass was found to have separated, and was removed in the same way. The fœtid discharge rapidly diminished after this, but it was not until the thirtieth day that I was able to take away the drainage-tube. The temperature, which had ranged from 100° to 103° before operation, fell to 99° afterwards, and never again exceeded 101°; it did not, however, become perfectly normal until the twentieth day. On the thirty-seventh day, the patient was allowed up, and at the present time is in perfect health.

In discussing this subject generally, it would be well if attention were directed to some of the points most in dispute. What, for instance, is the opinion of members on the doctrine of Lawson Tait, that all extra-uterine pregnancies are at first tubal? For my own part, a close study of the evidence has failed to convince me of its truth, and I agree with Harris that such a theory is refuted by those cases in which the placenta has been found attached to a remote part of the abdominal cavity. Again, do cases of tubal pregnancy frequently, or ever, come under the notice of the surgeon prior to rupture? and, if they do, what are the diagnostic points upon which reliance should be placed? and what treatment should be adopted?

In America, the diagnosis of such a condition appears to be by no means infrequent; and as regards treatment, the profession there are pretty equally divided into those who advocate abdominal section, and those who rely on electricity. I give in my adhesion to the former, for I cannot conceive how a mode of treatment can long continue to "hold the field," which may prove immediately fatal by causing rupture of the sac, and which, although it can kill the embryo, yet leaves it as a sleeping danger, liable at any time to light up fatal inflammation.

Finally, we come to the most difficult question of all. What is to be done in cases of advanced ectopic gestation? Are we to operate at once, or wait until the child be viable? or until after pseudo-labour and cessation of circulation in the placenta? And when we do operate, how should the placenta be dealt with? Four times it has been removed

with success at the time of operation, viz., by Martin, Lazyarewitch, Breisky, and Eastman—the two latter operators extirpating, in addition, the entire sac. In this ex-section of one or both, as may be possible, lies, I believe, our best hope of coping successfully with this great difficulty.

While I shall be glad to hear any criticisms of my own two cases, I think it of much greater importance to endeavour to have recorded, for the benefit of womankind, the matured opinions of Australian surgeons upon the unsolved problems connected with this subject.

CONDITIONS WARRANTING REMOVAL OF THE OVARIES AND TUBES.

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When abdominal section was an operation which involved serious risk to life from imperfection of details, it was natural it should be delayed till the risk to life was immediately palpable and great; and some vague rule existed that ovariotomy was justifiable, when the patient could no longer walk half a mile.

Now, more happily placed by experience and a comparative immunity from danger, the period of operative interference may be regulated and defined more in accordance with science by our experience of the comparative dangers of removal, and of non-interference or delay.

The diseased structures may be conveniently divided into:—

(1) Progressive ovarian cystic degeneration, and

(2) Other abnormal conditions of the ovaries and Fallopian tubes.

Progressive ovarian cystic degeneration.—In regard to the first, I would at once advance the necessity of immediate operation on the discovery of the tumour, for the following reasons:—

(1) That the operation in the earlier time is almost without danger.

(2) That the nature of the disease being progressive, removal will be ultimately compulsory.

(3) That complications in the course of its development are liable to occur, which greatly enhance the subsequent risk to life, whether uninterfered with, or in the operation.

That the operation in the earlier time may be almost without danger, in the hands of the laparotomist of the present date, will probably be accepted as not requiring proof. The removal of a practically unilocular cyst, without complication, is the easiest form of peritoneal removal

that can be found, and reports of such successful cases by general practitioners, all over the country, are constantly recorded. The incision may be but of two or three inches in length; the abdominal cavity need not be touched; no fluid need enter its cavity; and it would appear that, with the most ordinary abdominal knowledge, there is nothing to cause death. But if in the earlier stages there be difficulties, there can be little doubt that later they will have increased, and one cannot suppose that they can be materially diminished by the progress of the disease.

Nor is there a reasonable expectation but that the operation will ultimately be required. During the interval between the recognition of the tumour and the time when the condition of the patient necessitates its removal, the mind and health suffer, and danger is incurred of complications presently to be mentioned. It is true that such term may be long, yet it is rare that operation is not ultimately necessary. In a case reported in the *Lancet* of November 1887, I tapped a cyst occupying the pelvis in 1881, and removed a multilocular cyst in 1886. During the interval, the patient had been constantly in the hands of doctors, and was finally a complete invalid. By such delay, a period of health was lost. The longest interval with which I am acquainted is that of Mrs. L., æt. 73, who had, forty-four years previously, noticed a tumour in the right abdomen, and for the last two months had been incapacitated by pain in it. A dermoid cyst, universally adherent, was successfully removed. Thus, in a stationary tumour, as to size, even where degeneration had, or perhaps in consequence of its having proceeded to its utmost limit, removal was preferred by an old lady of 73, rather than suffer the pain induced by its presence.

The effects of pressure on the abdominal organs and vessels require to be only mentioned. This is not comparable to that of pregnancy, which, however occasionally injurious, is but temporary. The capacity for adaptation is frequently strongly exemplified, and we may wonder at the apparently small inconvenience; yet such pressure is often evidenced by the partial obstruction of the rectum by a pelvic tumour, producing constipation, flatulence, and indigestion, which promote chronic blood poisoning by absorption of fæcal matters, evidenced by the muddy complexion and depressed spirits. There is the annoyance of frequent or painful micturition, by pressure on the bladder; perhaps disease of the kidneys with albuminuria, by direct pressure, or more probably by partial obstruction of the ureters; congestion or disease of the liver, by pressure on it, or compression of the biliary duct; irritability of the heart, by its displacement upwards; œdema of the legs, by partial obstruction of the inferior vena cava or great veins; as well as ascites, from some one of these conditions. Some one or more of these results of pressure are witnessed in most cases of tumour of any size according to its site.

A complication which much creates new conditions of danger, is the peritonitis resulting in adhesions, whether induced by injury, or by inflammation extending from within the tumour, or by rupture of a cyst into the abdominal cavity. In the case of a Mrs. M., from whom I removed a large dermoid tumour, the intestine was thus firmly adherent to the abdominal wall, and compressed between it and the tumour, producing alternating obstruction and diarrhœa; for its

removal, an opening had to be made through the omentum. In the case of Mrs. L., the old lady of seventy-three, similarly with a dermoid tumour, the intestines were closely attached, while the sac was calcareous and in sections, resembling the hydrocephalic skull of a newly-born child. All her arteries were also densely atheromatous. This case was also complicated by a fibroid of the uterus, which occupied the whole pelvis. In a multilocular case of Dr. Hewlett's, in which there was great pain and high alternating temperatures, some small internal cysts of the tumour contained pus, others being of various qualities, and there were most firm adhesions everywhere, especially to the rectum and deep in the pelvis ; an injury was done to the intestine, and she died. Mrs. H. had a small ovarian tumour, which burst into the peritoneal cavity without apparent cause, and death ensued from acute peritonitis.

In a case on which I lately operated, the sac had dissected its way under the broad ligament. She took a long coach journey, and a sudden and large venous hæmorrhage occurred into the sac, so that the tumour greatly and rapidly enlarged, and her temperature rose ; so great was the pain, that she could neither lie nor sleep. At the operation, the sac was found partially mortified from pressure, the fluid being nearly black and very offensive ; being aspirated, the gas did not enter the peritoneal cavity ; the condition simulated that of a twisted pedicle. The sac had to be enucleated from the peritoneal membrane ; and, operatively, there appeared no reason why immediate recovery should not ensue, but she sank from the effects of the absorbed septicæmia.

It is unnecessary to multiply such cases. It is certain that the longer the existence of the tumour, the greater the probability of peritonitic adhesions and of consequent difficulty and danger in the operation, of mortification of the sac or its contents, of suppuration, or of spontaneous rupture and fatal peritonitis.

One of the most frequent causes of immediate danger is the twisting of the pedicle by rotation of the tumour. The size of the tumour, within moderate limits, does not appear to materially affect such rotation, which is rather influenced by its form, and the degree to which it may be steadied by its occupation of the pelvis. The almost invariable result of such rotation is peritonitis, from obstruction to the return of the venous blood ; but the death of the sac will depend on the completeness of such obstruction. In a highly unsatisfactory case, which I had some years ago, a very stout woman, with fat abdominal walls, had a deep laceration of the cervix uteri, with such eversion and granulations as to simulate malignant disease. I performed Emmet's operation on the cervix ; but immediately afterwards her temperature became high, and she got peritonitis, without apparent cause so far as the cervix was concerned. She presently died, and at the post-mortem, an ovarian tumour of the left side, of the size of the head of a six months' fœtus, was found to have twisted its pedicle, which induced the fatal inflammation. The whole attention had been centred on the condition of the uterus, and the examination of the abdomen of this thick-walled woman had been incomplete prior to operation, and impossible from distension after the advent of inflammation. Probably the rotation of the tumour had been effected by the laxation of the parietes under the anæsthetic, in conjunction with her being placed in Sims' position.

A very severe case of this rotation occurred in a patient of Dr. Schlesinger's, of St. Kilda, who had been putting up curtains. She had not suspected a tumour, having had many children. Her peritonitis induced a temperature of 105°. Having thus diagnosed, I removed the blackened gangrenous tumour, and she made an excellent recovery.

It is probable that the occurrence of pregnancy may tend to increase the probability of such rotation, by the enlarging uterus raising the ovarian tumour out of the pelvis. A patient of Dr. Barker's, of South Melbourne, the mother of three children, got an acute peritonitis, her catamenia having ceased for three months. On its partial subsidence, a tumour was found. On opening the abdomen, the dusky tumour was found full of dark blood, and the constriction of the veins was so great, that an extensive venous rupture was found on the right broad ligament with effusion of blood into the peritoneum, which conditions induced the inflammation. The patient afterwards miscarried, from the healed intestinal adhesions preventing the rise of the pregnant uterus, but she made a perfect recovery. This case was fully reported in the *Lancet* of November 1887.

Yet the constrictions need not be so complete. In the case of a tumour of the size of a child's head at term, the temperatures were erratic, and, it being some eight years ago, I awaited for some weeks their subsidence before operating. This not occurring, the abdomen was opened and the tumour removed ; but a general phlebitis had spread from the twisted compressed ovarian veins to those of the bladder and pelvis, to which she finally succumbed.

In another case, under the care of Dr. Browniess, the tumour of the size of a child's head had become so much twisted that she was seriously ill with peritonitis, and Dr. Brownless tapped the tumour. The patient continued ill, and was unable to perform her domestic duties ; on operation, I found a dirty brown cyst loosely adherent, but not so unnourished as to be actually gangrenous, yet sufficiently so to injure the system by absorption ; but her recovery was complete.

These cases are sufficient to show that, whether in small or large tumours, or in combination with pregnancy, rotation of the tumour with dangerous constriction of the veins is liable to occur, whereby greater danger is incurred.

That malignant disease is liable to be induced by persistent irritation, is established ; and the principle applies not less in the case of ovarian tumours than of other morbid conditions. In November last, I operated on a woman in whom an ovarian tumour of the right side had acquired extensive adhesions to the intestines, and had spread itself deeply under the broad ligament. A second tumour of the left side filled the pelvis, and from its upper edge sprouted epithelial growths, which were in a stage of rapid progress. The cases are not infrequent in which such cancer affects the mesentery and intestines, having apparently originated from the external surface of the ovarian sac ; such additional diseased growths form a further reason for an early removal of such a source of irritation. I have thought it well to adduce so many fatal cases, to show how serious simple cases are made by delay.

For the several consequences mentioned above, I think it cannot but be our duty to strongly recommend the removal of progressive ovarian cystic tumours at the earliest date at which we become aware that

they have risen out of the pelvis, or produce such pressure there as to require that it be reduced.

(2) Of the abnormal conditions of the ovaries and Fallopian tubes.—From the point of view of the desirability of removal, I would first consider the simplest, and advance towards the more serious.

Thus, certainly the simplest condition is the misplacement of one or both ovaries without adhesions, which so frequently occurs in the parous woman, as the result of lacerated cervix, with its so common sequelæ of sub-involution, retroflexion with dragging on the broad ligaments, and the falling back of an ovary, tube, or of both. Thus the ovary may become pressed between the fundus uteri and the sacrum; and on replacement, it may find its way to compression by a pessary. Such conditions as this may be met by various modes of treatment, and I have not seen the case which in my opinion necessitated removal.

As a further complication in these cases, pelvic peritonitis may bind down such misplaced ovary, when the case becomes identical in its condition with that of adherent ovary, which so frequently occurs in the nulliparous, next to be considered.

By far the greater number of cases of affected ovary or tube, or both, have their origin in the virgin or nullipara, though similar conditions occur in those who have been pregnant. The friends of a suffering girl find it necessary to take medical advice, and an examination is made. The simplest condition found, leading in the direction of enlarged ovary or tube, is perhaps a congested os, with eversion of cervical mucous membrane, forming the state called "granular"; and there is endometritis. Many of these cases simulate a laceration of the cervix, so large appears the opening, caused, however, by the pressure of the constant protrusion. A farther step may be, that the greater weight of the heavy inflamed uterus has depressed the organ in the pelvis; and, its axes being followed, retroflexion has resulted; or it may be anteflexion.

The ovaries and tubes have followed such retroflexion, and may be felt misplaced, tender, and perhaps enlarged. In comparatively few cases thus advanced can the uterus be replaced and retained in position, pelvic peritonitis having bound down the parts. In such peritonitis, the ovaries and tubes participate.

It appears to me, that the above states are originally caused by an inflammatory state of the lining membrane of the uterus, whether induced by a contracted outer or inner os; by pressure on the canal, from anteflexion; by deficient development; by flexion from accident; by unsatisfied desire; by excessive development and exudation of uterine mucous membrane, as in fibrinous dysmenorrhœa; or by the inflammation of gonorrhœa: that if such inflammatory thickening should exist near the uterine openings of the Fallopian tubes, and be sufficient to hinder or prevent escape of their secretions—a condition which a similar progressive inflammation of the tissues of the tubes, with compression of their proximal ends, serves to confirm—a bar to the escape of secretion is formed, which secretion, now rendered muco-purulent by the inflammatory action, passes out at the fimbriated extremities, whereby a pelvic peritonitis is caused: that thus the tubes become bound down, and unable to accommodate themselves to the surface of the ovaries: that

the ovaries probably participate in such peritonitis : that the Graafian follicles, as they develop in due course, can with difficulty burst through the organised peritonitic lymph : that their fluid thus accumulates, and compresses the ovarian tissue, producing pain, local inflammation, and gradual absorption of ovarian tissue : and that thus such ovaries are finally liable to become bags divided into a few small cysts, which cysts have no relation to the true progressive ovarian tumour ; or, if such follicles can burst, or the Fallopian distal extremities are free, and can continue to discharge their contents into the peritoneal cavity, successive attacks of more or less local peritonitis with progressive adhesions occur ; but if the fimbriated extremities be occluded as well as the uterine, accumulations in the tubes occur, forming muco-, hydro-, or pyo-salpinx, some relief to which may occasionally be afforded under varying conditions by escape of fluid into the uterine cavity.

I can adduce cases in every stage of the above-mentioned conditions, from those of the endometritis with extensive granulations, gradually advancing, as noted in the course of years, into the enlargement of the tube or ovary with frequent intermediate pain or invalidism, up to a case now under my care, in which there is extensive granular tissue at the os ; the uterus is enlarged and inflamed ; the left tube and ovary are enlarged ; there is general peritonitis and pelvic cellulitis ; and the temperatures vary from 99° to 103°.

From the consideration of the cause and progress of this class of cases, must be derived our opinion as to the desirability or otherwise of removing the ovaries and tubes ; and this will much depend on the period at which we see the patient. Early, nothing may be found but evidence of the inflammation of the lining membrane, with or without some thickening of the tube or ovary ; and undoubtedly, treatment adapted to the state of the uterus may be sufficient to restrain the progress of the disease, at any rate for a considerable time ; yet in several cases which I have watched for years, though the os and cervix appeared to have been rendered quite normal, an attack of pelvic peritonitis would occasionally occur, and a tube or ovary, at times scarcely felt, would enlarge—at last to subside, and the whole genital organs to become atrophic, or advance into permanently diseased bodies.

In view of the progressive character of the natural history of the disease ; of the formation of the adhesions, which, by lapse of time, become exceedingly dense ; of the liability of fluid, mucus, pus, or cystic, whether of the ovary or tube, escaping into the cavity of the peritoneum, the bowel, or bladder ; any of which complications much increase the danger of operation, I think it may be rightly determined to remove the diseased organs as soon as it is found that the woman can no longer satisfactorily perform the duties of her life ; or that frequent attacks of local peritonitis occur ; or when, from one such peritonitis of considerable duration, it may be inferred that the condition is one of progressive disease ; and that, in the presence of these conditions, the sooner the operation is performed, the less the danger and the greater the expectation of complete recovery.

Of the numerous complications which may occur, pregnancy may first be mentioned. In a fatal case of septicæmia after miscarriage, the pregnancy had occurred by the healthy tube, the other being a bag of pus. Had an operation successfully removed this tube and ovary, it

may have been that the pregnancy would have continued; certainly, had the conditions been recognised, the operation should have been performed. In view of the frequency of both tubes or ovaries being affected, the condition of only one of which may have been ascertained even in the case of considerable enlargements, as well as from other considerations and difficulties, it is evident that it is unsafe to trust to minor operations as aspiration, though several aspirated cases have terminated temporarily successfully enough; yet, in all but one, the parts have continued to give trouble, which would not have been the case had they been successfully removed.

The dangers of delay were exemplified in a case of many years' standing, in whom at length blood poisoning symptoms were acute, and it was evident life could not long continue. On operation, there was an exceedingly fœtid abscess of the left tube, embedded in the lymph of a chronic cellulitis and peritonitis, while the mesentery and omentum were closely adherent in the right pelvic cavity, with general matting and many points of gangrene. All was cleared away as far as possible, but the patient sank.

No doubt in gonorrhœal extension, the disease of the tubes and ovaries is usually double. In a case I lately read, among others, before the Medical Society of Victoria, a considerable abscess had formed in each ovary, but the left was so large as to push the uterus to the right, and the right abscess was not perceptible before operation on this account, and through the peritonitic distension. She recovered.

While, then, in the more chronic cases with no immediate danger we may calmly argue out the desirability of removal, such latitude is not justifiable in the more serious cases of blood poisoning temperatures, where, with some suppurative condition of tubes or ovaries, there may be peritonitis, and, indeed, usually is. Here the main point is, not to delay too long; again, the earlier the operation in this condition, the greater the success.

Yet of complications, there may well be great hesitation in those cases in which an undesirable delay has permitted rupture into the intestines. Such abscesses fill and empty, and thus alternate till the patient may be worn out, or succumb in an acute attack of peritonitis; but I have known some cases, in which finally the sac appeared to have closed or become quiescent. Yet this is not the usual result; and such has been the frequent discomfort and danger, that regret at neglect of the early operation has frequently recurred. In operating with such a tract, it is to be anticipated that the adhesion will so break down as to leave a fæcal fistula, the danger of which will mainly depend on the extent of cohesion by previous peritonitis. Such cases, as a general rule, are better left alone; but they should have been removed early, and in no case aspirated, which complicates removal.

And again, when pelvic cellulitis is a complication, the gravest doubts of successful removal may well be entertained. The anticipated matting of every tissue, coupled with the softening of a pelvic cellulitis, may readily permit the stripping off of the peritoneum with underlying cellular tissue, leaving a raw cavity, instead of the mere separation of adherent surfaces of peritoneum; and as the whole contents of the pelvis are intimately connected by inflammatory products, it is impossible in such an operation carefully to dissect part from part. In such cases,

it is a matter of anxious care to decide whether to hope that the patient will not die of her almost necessarily progressive disease, or to attempt removal; and again the rule holds good that, if it has to be done, the earlier the better, before the feebleness of the patient shuts out all hope.

The conclusions thus arrived at are:—

(1) That in the earlier or more chronic stages, the rule may be, that removal is desirable when a woman can no longer satisfactorily perform the duties of her life; or when attacks of local peritonitis are frequent, or where such an attack is of considerable duration.

(2) That in the stages of blood poisoning from absorption or presence of pus, without pelvic cellulitis or previous rupture into the intestine, removal is essential.

(3) That in the late conditions with pelvic cellulitis, or rupture into the intestine, such operation should only be entered upon as an alternative from the anticipation of eventual death, but be performed even then as early as such fatal natural conclusion seems positive.

TWISTING OF PEDICLE IN OVARIAN TUMOURS.

By Wm. Gardner, M.D., C.M. Glas.

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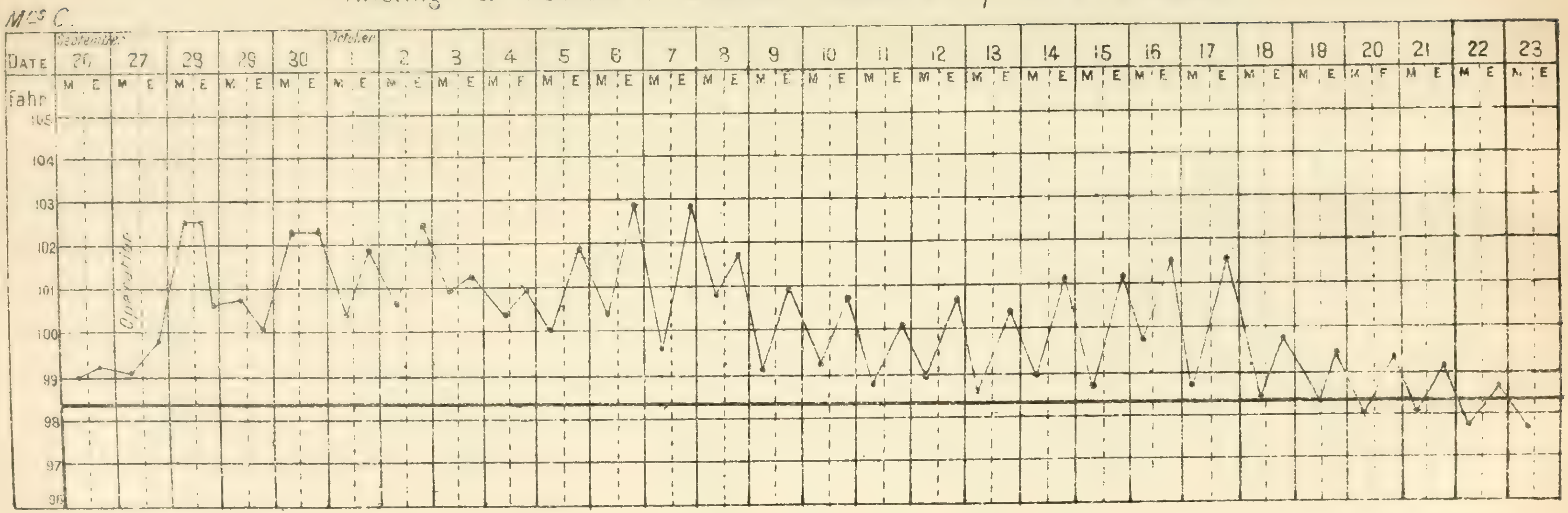
The subject of this short paper is of great interest to all gynæcologists and operating surgeons generally, both on account of the difficulties involved in the diagnosis, and also because many important points in treatment yet remain to be definitely answered. Personally, I had not given any attention to this condition until the occurrence of two cases in my practice, within three months, led me to study the literature of the subject. Appended to this paper are short notes of the cases to which I refer, and they are instructive because they furnish examples of successful and unsuccessful terminations. In Case No. 1, it is evident that rotation of the cyst took place with twisting of the pedicle, followed by extravasation of blood into the cyst and peritonitis, with the formation of adhesions as a conservative process, and designed to assist in carrying blood to the tumour, the supply of which must have been to a large extent cut off by the rotation of the pedicle.

The patient was not known at the onset of the symptoms to be the bearer of an ovarian cyst, and the appearance of the pedicle, when cut, was strongly suggestive of what one would regard in other parts as gangrene.

Case No. 2 is an example of a patient not known to be suffering from ovarian tumour, but in whose case rotation occurred during pregnancy, followed by extravasation of blood into the cyst, and then finally rupture into the abdominal cavity and peritonitis.

In both cases the symptoms, as interpreted by the medical attendants, pointed to obstruction of the bowels; but in the first case, the discovery and aspiration of a tumour, under ether, led to a correct diagnosis of ovarian cyst. In the second case, however, no diagnosis was arrived at,

Twisting of Pedicle in Ovarian Tumours, by Dr W. Gardner.



as the tumour was small, and the patient was four months advanced in pregnancy. It is noteworthy, that the direction of the twist in the second case, which was a right ovarian cyst, was from right to left; and in the former, it was from left to right, the left ovary being involved in this case.

The treatment adopted in the first case was to wait until the acute symptoms had passed off, and then perform laparotomy, which fortunately was successful. In the second case, the problem presented to us was a much easier one, as diagnosis, after rupture of an ovarian cyst not known to be present, is impossible. We came to a decision to perform laparotomy for some unknown abdominal condition, as the patient was rapidly becoming worse, and it was a last, though not very promising, chance. The result of the laparotomy was failure, and abortion took place; but, as cure could not have taken place by nature's unaided efforts, the operation was in my opinion fully justified, although the duration of the illness (a week) militated against success.

In the *International Journal of the Medical Sciences*, October 1888, Mr. Thornton, in an excellent paper from which I quote freely, states that out of 600 cases of ovariotomy, fifty-seven had twisted pedicles, *i.e.*, more than 9 per cent.; and seven of these had ruptured at the date of operation, *i.e.*, 14 per cent., or about 1 per cent. of the whole number of cases. Of the fifty-seven cases, four died after ovariotomy; and of the seven cases of ruptured cyst, one only died.

History.—Thornton states that Patruben, in 1855, recorded a case of rapidly fatal intra-cystic hæmorrhage, from rotation of an ovarian tumour. Rokitansky, in 1841, first drew attention to the subject in his "Handbook of Pathological Anatomy;" and in 1865, the same author published a paper on "Strangulation of Ovarian Tumours by Rotation." In making autopsies in fifty-eight cases of deaths from ovarian disease, he found twisted pedicles in eight cases. Spencer Wells, at page 61 of his work on "Ovarian and Uterine Tumours," says that he met with this condition in from eighteen to twenty cases, and in two of the cases it caused death before operation.

Wiltshire, in the "Transactions of the Pathological Society of London, 1868," has published notes of a case in which he successfully removed a strangulated ovarian tumour during the acute stage of axial rotation.

Lawson Tait and Alban Doran have published a number of cases, and have written in their respective works on "Diseases of the Ovaries" on the subject, and to these works we shall later on refer. Scattered through the medical literature of the last few years are a number of single cases, illustrating more or less completely the various interesting phenomena accompanying the condition of twisted pedicle.

Results of the Accident on the Tumour and Surrounding Parts.

Spencer Wells says that, after rotation has occurred, "the great veins are compressed, and blood continues to pour in by the arteries. Congestion, exudation of serum, extravasation of blood into the cysts, and rupture follow in rapid succession; and unless timely relief is afforded by ovariotomy, the patient soon sinks. If the rotations are so complete and enduring as to strangulate the arteries of the pedicle, gangrene is

inevitable. In other instances, the constriction of the vessels by the change of position is so moderate, that the tumour itself is not much affected, but it remains stationary, and contracts adhesions to some of the viscera, and cannot be replaced."

Rokitansky mentions one case in which a strong cord-like band so ligatured the sigmoid flexure of the bowel, that the slightest change of position rendered it impermeable. The bowel has also got so entangled with a long pedicle, during rotation, as to become strangulated. Even after new vascular alliances have been formed between the rotated tumour and the omentum and viscera, the pedicle has by some means, either tension or pressure, been divided. In such a state of transplantation, the tumour has drawn its nutriment through the newly-formed vessels of the plastic adhesions, and its parasitic existence has not been much less vigorous than before.

Thornton expresses his views as to the results of rotation in the following passage :—" First we have interference with the circulation ; the firm arteries, resisting pressure, continue to pump in blood, which the yielding veins cannot return quickly enough, so that congestion with exudation of serum, rupture of vessels, and extravasation of blood and rapid enlargement of the cyst, result. These processes are accompanied by acute pain, chiefly referred to the pedicle, and due to the pressure to which its nerves are subjected, but also in extreme cases extending over the whole surface of the tumour ; also by reflex symptoms, such as vomiting and collapse, and by fainting and pallor, the result of internal hæmorrhage. The strong fibrous covering of the tumour prevents rupture of the external vessels, and in the majority of cases confines the effused blood ; but if, as sometimes happens, previous inflammatory changes in the cyst-wall have caused blocking of vessels and deficient nutrition of portion of its substance, these, being soft and lacerable, give way, and the mixture of ovarian fluid, serum, blood, and clot, is poured into the peritoneum. This accident is, as we have seen, often speedily fatal ; but in many cases, the pedicle vessels being closed by clot, the hæmorrhage ceases ; the effused matters, after causing more or less peritonitis and fusion of parts, are absorbed, and the patient slowly recovers, till the rent in the cyst heals, and the adhesions affording a new blood-supply, the tumour starts growing again."

Theories as to Causation.

In 1880, Lawson Tait read a paper before the Obstetrical Society founded on three cases of twisted pedicle in right-sided tumours, and advanced the theory that the solid wedge of fæces passing down the rectum was the cause of the rotation. This may be one of the causes, but cannot be the only one, as Thornton's cases show an almost equal number of twisted pedicles in right and left-sided tumours, and this theory would not explain the latter. Thornton, in a paper published in 1877, suggested " that the peristaltic action of the intestines may start the process, and that the twist once started, the pulsations through the cord thus formed would tend to increase it." He also said, " If the case is complicated with pregnancy, the fœtal movements may play an important part."

Doran, in describing a post-mortem on a case of ovarian tumour complicated with cancer of the rectum, says :—" A little artificial

distension of the intestine caused it to press against the tumour so as to push its left side backward, stretching and twisting the pedicle." There was no twist in the pedicle, but its vessels were blocked with old clot, and he considered it probable that the loading of the rectum, caused by the cancerous stricture, may have caused enough twist to set up clotting in the vessels. Doran's opinion is that "as a rule the twisting of a pedicle is to be explained by the simple doctrine that the tumour, pressed upon by the viscera and even the costal cartilages above, and by the pelvic structures below, but comparatively free laterally and anteriorly, rotates on its own axis every time that the patient, after walking or lying on her back, 'turns round and rests on her side.'"

There is a general consensus of opinion, that pregnancy predisposes to rotation in ovarian tumours; fourteen out of Thornton's fifty-seven cases were thus associated.

Tapping has also been suggested as a possible cause of rotation, and in several recorded cases it certainly preceded the accident by a few days.

Other causes too numerous to mention, and unfortunately, also, too insusceptible of proof, have been suggested. They are mostly of the *post hoc, propter hoc* kind. Klob has suggested the alternate filling and emptying of the bladder as a cause.

Direction of the Twist.

For tumours of the right side, the twist is generally from right to left, and the reverse in tumours of the left side. My two cases followed the general rule, but there are a few undoubted instances on record in which twisting in the reverse way took place. Dermoid and small tumours are specially liable to rotate.

Remarks.

Looking back on my experiences in ovariotomy, I feel sure that I have frequently passed by unnoticed minor degrees of rotation, but the cases now recorded are the only ones in which I have met with serious pathological results. As far as my reading goes, the only contribution in Australia to the interesting subject of rotation of ovarian tumours was made by Dr. Balls-Headley, in the *Australian Medical Journal* of November 15th, 1880; and although in the discussion which followed, some of the speakers ventured to doubt whether the case was one of axial rotation, I cannot help thinking, from the reported condition of the cyst contents, and the recently-formed adhesions, that the operator was correct in his interpretation of the facts.

Case I.

Mrs. C., æt. 38, married, residing in Adelaide. Was delivered of her last child eighteen months ago, and since has complained of pain in the left ovarian region, and the last few periods have been profuse for the first and second days, and then stopped suddenly. She was attended four months ago for constipation and pain in the left iliac region, supposed to be due to colic, and relieved by enemata.

Present illness began on the morning of August 16, 1888, with acute pain in the left iliac and lumbar regions, accompanied with nausea,

vomiting, and constipation. Patient stated that the period had stopped suddenly on the 14th. Temperature found to be normal; pulse 84, full and regular, features pinched, abdomen excessively tender in the above-named regions, with an ill-defined sense of fulness. Ordered hot fomentations, and a mixture containing morphia.

August 18.—Pain much more severe; vomiting continues; bowels still unrelieved in spite of enemata; pulse 84, temperature 99·8°.

August 19.—Slight improvement; sickness has ceased; bowels not yet opened; pulse and temperature as before. 11 p.m.—Patient fainted on getting out of bed to pass urine, and remained unconscious for half an hour. Takes nourishment badly. Rectum examined and found normal. Vaginal examination shows no fulness. Uterus not fixed; painful on pressure. Abdomen much fuller on the lower left side, with severe pain; no sleep.

August 20, 8 a.m.—Much worse this morning. Face dusky, features pinched. Pulse 120, feeble, regular. Breathing quick and shallow. No sickness, and bowels have not acted. Tongue moist, but furred. Abdomen still more swollen, and tender in left iliac and lumbar regions. 11 a.m.—Seen by Dr. Gardner in consultation with Dr. Marten, but abdominal tenderness was so great that palpation could not be borne. It was decided to try if the swelling was due to fæcal accumulation by passing a long rectal tube, and administering an oil and gruel enema. Flatus passed, but no motion; $\frac{1}{80}$ gr. of strychniæ sulph. was given hypodermically every four hours. 6.15 p.m.—Pulse 120, feeble; no sickness, and no action of bowels. Tongue moist, but furred. As there was no improvement, it was determined to place the patient under the influence of ether. The abdomen was thoroughly examined, and an elastic and movable swelling was detected in the left lumbar and iliac region, extending high up and well to the left of the mid-line. Vaginal and rectal examination revealed nothing abnormal. Temperature 102°.

August 21.—Patient was again placed under ether, and the tumour aspirated by Dr. Marten, and thirty ounces of red, glairy fluid removed. The operation gave great relief. Under the microscope were seen numerous red and white blood-corpuscles, and some variable sized oily-looking rounded masses. The fluid was sticky, and highly albuminous. No Drysdale corpuscles found. 6 p.m.—No action of bowels. Ordered calomel gr. iv., immediately, to be followed by ℥j hst. sennæ co. if required. Temperature 99·8°; pulse 116. Pain and fulness in the left iliac and lumbar regions have almost disappeared. Retention of urine relieved by catheter.

August 22.—Seen with Dr. Gardner. Swelling can still be detected, but is not tender, and has a well-defined rounded border.

September 5.—Bowels have acted freely, and the patient continues to make satisfactory progress as regards her general health, and there is no increase in the size of the tumour. Temperature varies during each day from 99° to 100°.

September 24.—Patient is in excellent spirits, but has wasted slightly and complains of pain in the left ovarian region, increased by movement. Tongue clean; appetite fair. The abdomen is irregularly distended and prominent, especially over the lower left half where there is increased resistance, dulness on percussion, and marked tenderness. No dulness in either flank; measures forty-two inches at umbilicus, nine and a

quarter from lower anterior superior spine to umbilicus, and eight and three-quarters between the same points on the right side.

September 27.—On this date, at 8.30 a.m., ovariotomy was performed by Dr. Gardner in the Private Hospital, South Terrace, to which she had been removed. Dr. Marten assisted, and Dr. Giles administered ether. An incision was made three inches long in the linea alba, and carried through an inch of fat, and the peritoneum was opened to the full extent of the external incision. There were recent adhesions in front, which were easily broken down. When the trocar was thrust into the tumour, three pints of dark thin bloody fluid escaped, and ran freely, also into the abdominal cavity by the side of the canula, as the cyst-wall was so friable, that it gave way on the slightest touch. Adhesions, which were numerous, were then dealt with, and the pedicle was found to be rotated from left to right, and the tumour required to be turned completely round twice in the opposite way, to get rid of the axial rotation. The pedicle was transfixed and tied with Spencer Wells' silk, and the cyst removed. The stump was of a greenish black hue, such as we associate with gangrene in other parts, and it was deemed advisable to pare it down as closely as possible to the ligature. The right ovary was found to be slightly enlarged, and was removed. The tumour was found to be almost gangrenous, owing to twisting of its pedicle, and was full of old blood-clots. Its blackish-green surface was covered with fairly recent lymph. The abdomen was then washed out with warm boracic solution, until it was thoroughly clean. A glass drainage tube was inserted into the lower angle of the wound, which was closed with silk sutures in the usual way. Patient stood the operation well, made a slow recovery, and is now perfectly well, except that she is much troubled with flushes.

For the above notes, I am indebted to my friend, Dr. Marten, and I have also to thank him for the opportunity of seeing this very interesting case, and performing the operation, which resulted so successfully.

Case II

Mrs. C., æt. 41, has had eight children, with post-partum hæmorrhage on several occasions, and after the last child was born the hæmorrhage was severe, although the labour was in other respects easy. Recovery was in each case good, except after the first, when she was confined to bed for eight months, owing to some unknown cause. Previous health good, except occasional bilious attacks and flatulence. Present attack began on October 26, 1888, by two sudden attacks of pain in the right iliac region, which passed off in a few minutes. She was first seen by Dr. Allwork, at 3 p.m. on October 28, when the face had an anxious expression, and the skin was slightly tinged with bile. The legs were drawn up on the abdomen; temperature normal, pulse 115, small and feeble. Pregnancy had advanced to four months. She complained of intense pain, which commenced two hours before, in the right iliac region, with intermittent spasms of agonising pain every five or six minutes, extending across the lower part of the abdomen, and down the inner side of the right thigh to the knee; and during the paroxysms, the right thigh became exquisitely tender. At the first onset of pain, passed two normal stools at short intervals, giving temporary relief. Vomiting followed immediately, the ejecta consisting at first of food and

then mucus and bile. There was extreme tenderness over the right iliac region, where an irregular, somewhat cylindrical mass could be felt extending upwards towards the liver. There was dulness on deep percussion; no fluctuation; swelling elastic, and exceedingly tender. There was also some tenderness over the whole abdomen, and particularly over the uterus. Examination per vaginam revealed no signs of threatening abortion. Opiates were given internally, and soothing fomentations applied to the abdomen.

October 29.—Very little relief; one attack of vomiting since last night—not stercoraceous. No motion nor flatus passed, but intestines distended. Aperients and copious enemata administered, without relief, through a long rectal tube. Temperature normal; pulse 120, feeble.

October 30.—The paroxysms of pain are slightly less severe.

October 31.—Increasing distress, and abdomen gradually becoming more tympanitic. Opiate treatment continued.

November 1.—Small amount of flatus passed once, but no motion. Patient anæsthetised with chloroform, and insufflation performed per rectum without result. No blood passed per anum.

November 2, 7 a.m.—Small amount of flatus, and also fæces and mucus passed. Dr. Gardner was telegraphed for from Adelaide, and saw the patient with me. At the consultation it was decided, as a last hope, to perform laparotomy, and at noon the patient was placed under the influence of ether by Dr. Yeatman. Dr. Gardner having emptied the bladder, made the usual abdominal incision in the linea alba; and on opening the peritoneum, blood and clots escaped freely. The whole hand was then passed into the abdomen in the direction of the right iliac fossa, and a mass discovered which had some loose connections to the ascending colon. These were easily separated, and tracing the tumour back, it was found to be connected by the ovarian ligament with the right horn of the uterus. It was then drawn out of the external opening, and found to be an ovarian tumour, which was rotated, and had ruptured. The rotation was from right to left, and two complete rotations of it had to be made in the opposite direction to prepare the pedicle for ligature. The pedicle was long, and the opening in the cyst admitted several fingers. The ligature was then applied in the usual way, and the abdomen thoroughly washed out with boric acid lotion. A drainage tube was inserted, and the abdomen closed with silk sutures. 7.30 p.m.—Patient in a semi-comatose condition. Temperature 102°; pulse 175, almost imperceptible; respirations 40, shallow. Administered stimulant enemata and ether hypodermically, but condition did not improve, and the patient, after aborting, gradually sank, and died at 6 p.m. on November 3, the day after the operation.

For the above notes, I am deeply indebted to Dr. Allwork, who made them at great personal inconvenience, as he was practising in a town nine miles distant from the patient's residence, and I was not able to see her after the operation—she was residing sixty-two miles out of Adelaide. Not much was to be expected from an operation performed so late in such a case, but we deemed it right to give the patient the remote chance; however, the "unexpected," which so frequently happens, unfortunately failed to do so in this case.

PUERPERAL HYSTERECTOMY; OR PORRO'S OPERATION BY A NEW METHOD.

By H. Widenham Maunsell, M.D.

Honorary Surgeon, Dunedin Hospital.

Porro, of Pavia, was the first surgeon who successfully amputated the pregnant uterus in a woman—Utero-ovarian amputation as a mode of completing Cæsarian section. The operation was performed twelve years ago in the Maternity Hospital of Pavia, on a woman deformed by rickets. Since then, the operation has been performed two hundred times, with a mortality of nearly fifty per cent.

Instruments required.—Strong scalpel, large strong circular amputating knife, two pairs of strong scissors, eighteen pairs of Spencer Wells' artery forceps, two strong slightly-curved needles, on handles; curved surgical needles, suitable sutures and ligatures, specially prepared; yard of strong rubber tubing, for tourniquet; Tait's recent modification of Kœberlé's serre-nœud, with needle for transfixing pedicle; three large flat sponges, the bichloride antiseptic solution, and large quantities of hot water.

In performing laparotomy in the median line, the incision should be lower than for simple Cæsarian section, as the stump of the amputated uterus has to be brought out immediately above the pubes, as in hysterectomy. A sound should be passed into the bladder, and every care taken not to injure it, as it is often dragged up above the pubes in these cases.

New Method of Treating the Stump.

(1) The incision should be long enough to permit of the gravid uterus being taken out of the cavity of the abdomen.

(2) While an assistant takes charge of the gravid uterus, place a large flat sponge, wrung out of hot water, over the bowels, to keep them warm and out of sight; and rapidly suture up the wound with strong salmon silkworm gut, as far as the neck of the uterus, which is pressed towards the pubic end of the wound by an assistant.

(3) Open uterus by longitudinal incision in upper third, and remove child, leaving placenta behind.

(4) Transfix the neck of the uterus with a strong transfixion pin, and apply the rubber tourniquet below it.

(5) Ligature the vessels of the broad ligament *en masse* on both sides, immediately above the pin and torniquet.

(6) Pack round with sponges. Make transverse incision through peritoneum covering the top of the uterus. and rapidly reflect it to within half an inch of the rubber tourniquet. If the peritoneum is found to be very adherent to the fundus, make a circular incision all round the upper third of the uterus, and reflect it as above described.

(7) Apply Kœberlé's pin and wire écraseur to the neck of the deperitonised uterus.

(8) Amputate the uterus with a large circular amputating knife, leaving a fair stump beyond the pin.

(9) Apply torsion and ligature to any bleeding points, as the assistant slowly and cautiously removes the rubber tourniquet and transfixion pin immediately above it.

(10) Secure the lower end of the laparotomy wound, immediately above the stump, with a strong acupuncture needle.

(11) Place a thin layer of iodoform wool under the reflected peritoneum, which is spread out like a saucer round the stump. Secure the edges of the reflected peritoneum loosely to the skin by five or six horse-hair sutures.

(12) Screw up the wire clamp daily. Dress the stump night and morning with a thick layer of iodoform and absorbent wool.

I have advocated this method of treating the stump in cases of hysterectomy for fibroids. As far as I know, this method of treating the stump has never been tried or suggested before. Its advantages may be summed up as follows:—

(*a*) The bladder and ureters cannot be injured by the écraseur.

(*b*) There is no tension of the peritoneum or broad ligaments.

(*c*) The stump cannot retract into the cavity of the peritoneum.

(*d*) The stump is effectually shut off from the cavity of the peritoneum; and as it shrinks and sloughs away, it is impossible for the matter to drain on to the abdominal wound, or into the cavity of the peritoneum.

Godson's Classification.

(1) True Porro operation—fœtus viable.

(2) Utero-ovarian amputation performed during pregnancy, before fœtus is viable.

(3) Laparotomy for removal of fœtus from abdominal cavity, followed by amputation of ruptured uterus and ovaries.

The same treatment of the stump applies with equal force to all these conditions.

In puerperal hysterectomy, experience is strongly in favour of the extra-peritoneal method of treating the pedicle. According to Godson's tables, eleven died out of fifteen cases treated by intra-peritoneal methods.

DISCUSSION.

Dr. Jakins supplemented Dr. Rowan's experience with a case of his own, in which an ovarian tumour had been diagnosed as a complication of pregnancy in a single girl. Abdominal section was successfully performed. He did not quite see the necessity for Dr. Batchelor's abdominal section if the pelvic diameters were normal.

Dr. Balls-Headley agreed thoroughly with Dr. Batchelor, as to his views on the treatment of diseased tubes and ovaries. There could be only one method of dealing with such conditions—viz., removal. Dr. Batchelor's Cæsarian section opened up the question as to whether, with our increasing knowledge of abdominal surgery, we should do craniotomy at all. He favoured the treatment adopted in this instance

by the President. In his recent experiences in an osteomalacia district in Germany, he had had numbers of women pointed out to him, the subjects of Cæsarian section—as many as five times in the same woman. Dr. Batchelor had not given the pelvic measurements. He agreed with Dr. Rowan's views as to ovariotomy during pregnancy—a much safer proceeding than the risk of twisting of the pedicle, with death of the sac or premature confinement.

Dr. Worrall agreed with Dr. Rowan, especially (as pointed out by Dr. Balls-Headley) as the twisting of the pedicle increased the danger. Like Dr. Batchelor, he thought that oöphorectomy checked the growth of fibroids; but in cases of cancer, he preferred the operation through the vagina. He thought craniotomy, or even the removal of the uterus altogether, applied to the obstetric case of Dr. Batchelor. He preferred No. 2 silk for ligature. On one occasion, after operation, he re-opened the abdomen on the eighth day; found it full of pus, washed it out, with good results. In his experience, ligatures often remained, and came away after months, with pus in their track.

Dr. Rowan was quite in accord with Dr. Balls-Headley's views. He believed that rest and other measures should be tried before resorting to the heroic operation. He had had cases where rest had relieved troublesome ovaries; but where an ovary was encysted and bound down, and laid a woman up, he felt himself justified in operating. He had done so some sixty or seventy times, and had no cause for regret. With regard to Dr. Batchelor's Cæsarian section, he had seen only one case. He had been consulted by a woman, two or three months married, as to why she was not pregnant. He found the vagina occluded, and thought she was not likely to become pregnant. The next time he saw her, she had been in labour fifty-two hours, with no possibility of delivery *per vias naturales*. He performed Cæsarian section, using catgut sutures for the uterine wall. The patient unfortunately collapsed the second day, all the sutures having come undone. In reply to Dr. Balls-Headley, he stated the sutures were ordinary carbolised gut. The knots became untied. He would like to ask Dr. Worrall if the absence of fœtal consistence did not (in one of his two cases) point to something else?

Dr. Meyer endorsed the views of the President, their soundness being manifest from his practical and happy results. He begged, however, to differ from the propriety of Cæsarian section in the obstetric case. He had met with a very similar case, where two medical men advised section in a woman who had been some forty hours in labour, and on whom forceps and version had been carefully tried in vain. He performed craniotomy with a perfectly successful result. The case read exactly like Dr. Batchelor's. He was not ready to discard craniotomy from the list of obstetric operations.

The President said that he preferred Cæsarian section in this case, having in mind a similar one—a case of convulsions—where (after weighing the value of a Porro) he delivered by vagina, with the result—death in twelve hours. He had no right to render the woman sterile. Another point was the absence of the husband. As to the propriety of abdominal section in cases of cancer, he was opposed to Dr. Worrall, who favoured the vaginal method. In this case, the broad ligaments being involved, the only question was—Should operation be done at

all? He thought if so, there was but one way. Although opposed to all authorities, he would (unless with a very capacious vagina, an easily prolapsed uterus, and all circumstances favourable) invariably make an abdominal incision. He saw no reason why a small incision of two or three inches should endanger the operation. You saw what you were doing, and did not injure the ureters. Although statistics were in favour of vaginal operation, it was probably because the *worst* cases had been treated by abdominal section. He quite agreed with Dr. Rowan, not to operate till other measures had been tried and failed. The dangers of operation at delivery, favoured operation on tumours during pregnancy. Neglected tumours often sloughed. The doubt which Dr. Rowan had expressed as to the nature of one of Dr. Worrall's cases, was removed by the fact that decidua came away.

SHOULD A MEDICAL MAN PRACTISE MIDWIFERY, WHILE IN CHARGE OF A CASE OF PUERPERAL FEVER?

By Jos. C. Verco, M.D. Lond., F.R.C.S. Eng.

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There is an opinion current among the people and in medical circles, that the occurrence of a case of puerperal fever in the practice of a medical man demands the discontinuance of obstetric work, until such time as he shall be certainly free from the case and its contaminating influence. This opinion, though somewhat indefinite in its application and partial in its prevalence, is nevertheless a kind of *lex non scripta*. The more timid or the more conscientious among the profession are ruled by it. They sacrifice their immediate pecuniary interests by cancelling every forward engagement as it falls due; and since by this very means they gain an unenviable notoriety, they suffer loss, remote, but no less certain. Bolder spirits, or less sincere, ignore this opinion, and continue their work with a still tongue. But in so doing, they play a perilous game—one that, by an accident or a coincidence, may place them in a serious position, where censure, swift and sharp, may be meted out to them, both by the profession and the people; and where they may be involved in the uncertain toils or ruinous processes of the law.

Now, if this opinion be valid, the reckless temerity of the bold must be resisted; but if, on the other hand, it be invalid, the timid must be reasoned out of their fears, and the public must be educated out of their popular fancy. A full discussion of the question by the leaders of thought amongst us is, therefore, of no little moment, and a plain expression of opinion by those most competent to form one.

If the Conference unanimously negatives my question, then a practitioner can honestly refuse to carry out his midwifery engagements, and

can openly appeal to this consensus, in order to prevent the misconception and misrepresentation which such refusal may provoke, and to obviate the necessity for such petty frauds as a healthy right arm, borne for weeks in a sling.

If, however, this Conference decides in the affirmative, then, while continuing in his obstetric work, its moral support will be his, and he will be free from the fear of forfeiting the respect of his medical brethren, or ruining his public reputation. And if, to-day, opinions differ upon the subject, so as to be even equally divided, then the *lex non scripta* will be proven no law whatever, and the individual practitioner will henceforth feel at liberty to follow the dictates of his own enlightened reason and conscience in regard to the particular case, or the special circumstances with which he may be concerned.

Whatever, therefore, may be the mind of the Conference upon the issue raised, the result will be beneficial, and with this confidence, I proceed to discuss it.

The consideration of the question, I propose to direct along three chief lines, viz. :—

(1) What evidence exists, that the puerperal fever under our care has arisen from previous cases of the same disease?

(2) What evidence exists, that during the conduct of a puerperal fever case, midwifery may be practised with impunity?

(3) If puerperal fever preclude midwifery work, what shall be our definition of that complaint?

If the instances with which we are acquainted are known to have originated from similar ones, occurring just before them, this would be a strong argument in favour of abandoning obstetric work in the presence of puerperal fever; but if they are ascertained to be almost invariably sporadic, and to have generally no causal relation with previous examples, then its continuance would be justified. So also would it be, if we can demonstrate immunity from transmission of the disease, in cases of puerperal fever treated by the accoucheur, while in full obstetric practice. And lastly, before we decide upon the necessity of relinquishing midwifery directly we are face to face with puerperal fever, let us regard the difficulty of determining with precision which of the post-partum pyrexias must be designated by so terrifying and so binding a name.

Our first inquiry then is, What evidence have we, that puerperal fever arises from previous cases of the same disease? During the past ten and a half years in South Australia, I have attended 1255 cases of parturition, and have lost four patients only, all of whom died of fever:—

One, a primipara, was seen first at eleven o'clock p.m.; and at 4.15 a.m., as the head, with a large caput succedaneum, was somewhat delayed on the perineum, forceps were applied, and the delivery was easily effected without perineal rupture. At 5 p.m. of the same day, *i.e.*, about twelve hours afterwards, she had a long severe rigor, and after eight weeks of illness, during which she had rigors almost daily, and on some days more chills than one, she died, without developing any objective signs of local disease, except towards the termination of the case, when some albuminuria, anasarca and bed-sores appeared. Regarded clinically, it was as well marked an instance of septicæmia as could be conceived.

How did it arise? The occurrence of the rigor, with a temperature of 102·6°, within twelve hours of delivery, tends to negative the explanation of sapræmia from decomposition of lochia, especially as it arose during the cool month of August. So also the rigor within seventeen hours of the first examination by the accoucheur, renders somewhat improbable infection by him with an animal poison; and as a fact, it was learned that the patient had been "out of sorts" immediately prior to delivery, and had had medicines prescribed by a chemist. But on the supposition of contamination by the medical attendant (which in many of these cases is, I think, somewhat gratuitous), whence came the virus? I had no puerperal fever under my care, but for four days I had had a boy with malignant scarlet fever, who subsequently died of pleural effusion and pulmonary gangrene; besides another child with acute tibial periostitis (whose subperiosteal abscess had been opened however, three weeks), and in whose ailment there was some pyæmic element, as manifested by an abscess some months after in connection with an exfoliation from the humerus. There was also a boil on my own right arm, in the stage of suppuration, about two inches above the wrist. Any one of these three may have been the source of the septicæmic bacilli; but no puerperal fever origin can be traced.

The second was a primipara, delivered with instruments, when the head was at the lower end of the sacrum, without perineal rupture. On the second day, the temperature was 104° F. She had had hardness of hearing from before her delivery. On the fifth day, large diphtheritic patches were discovered in the fauces; then it appeared, that some soreness of throat had been experienced, though not complained of, ever since the parturition. On the day following, the urine was smoky and slightly albuminous. On the 14th day she died. This was evidently post-partum diphtheria. I was not treating any patients with this complaint at the time; but it was learned, that the mother of the deceased had suffered from a serious attack of this affection three weeks before.

The third was a multipara. The child was born, and the placenta removed by the nurse before my arrival. There had been severe abdominal pain some days before the confinement. She developed symptoms of abdominal inflammation, and died on the eighth day.

The fourth was a primipara, whose left hip was fixed by old disease, and who had been afflicted for many years with rectal stricture. The bowel, from about two inches above the anus, was impermeable to the finger, but per vaginam could be felt enlarged, thick, and hard, as high as it could be reached. There were secondary fistulæ in ano, always discharging sanious pus. After thirty-six hours of labour, with the head still at the brim, she was etherised; the forceps were applied, and with great difficulty the head was brought through a pelvis, somewhat contracted to the very outlet. After a few days, fever supervened with rigors, and these recurred at intervals for many weeks. There developed in succession—swelling of the left sterno-clavicular articulation, the right shoulder, the left temporo-maxillary joint, and the left parotid gland—all without suppuration; panophthalmitis of the left eye, with collapse of the globe; discharge of abundant fœtid pus per rectum; an abscess of the left gluteal region, apparently connected with the bowel; suppuration in the diseased hip-joint gradually wasted

her, and she died eight months after delivery. This was an evident puerperal pyæmia; nor was the cause far to seek. The diseased suppurating septic bowel, bruised by the passage of the head through a pelvis diminished in its capacity by old morbus coxæ, became inflamed, and provided a focus of infection for the system.

These are the only instances of death, or death from puerperal fever, which have come within my experience in South Australia, and from them I conclude that, in its ordinary sporadic form, the disease can very rarely be attributed to infection from previous cases of a like kind. It would lead me too far, and into too much detail, to enumerate and discuss all the cases of post-partum pyrexia which have recovered, amongst these many hundreds of deliveries. Suffice it to say, I have been unable to trace any causal connexion between any two cases of such feverishness under my care.

To what extent we can trace the instances I have given:—They may have arisen from a scarlet fever patient under medical care, from a diphtheria, from a surgical pyæmia, or from a surgical disease such as rectal stricture and fistulæ in ano. And does not this possibility press upon our consideration another view of the matter?

There is not room for doubt, that much of the puerperal fever encountered does originate from such diseases as scarlet fever, measles, diphtheria; from such surgical affections as erysipelas and pyæmia; and from the putrefactive matters of the post-mortem room. Hence, to bring the lying-in woman into proximity with patients suffering from any of these complaints is reasonably regarded as eminently dangerous and reckless. But do we therefore decide that the general practitioner, who has under his care a case of scarlatina, of measles, of diphtheria, of erysipelas, of pyæmia, must, during this period, and for a week or a month afterwards, do no midwifery, lest he should communicate puerperal fever? Do we forbid every man who is engaged in obstetrics admission to the post-mortem room? To insist on this, would practically exclude the general practitioner from the realm of obstetrics; for how seldom does he find himself entirely free from infecting patients? And yet if the attendant on a puerperal fever case is thereby forbidden midwifery, because he may transmit the fever poison, for the same reason and to the same extent should the ban apply during the conduct of these other infectious and contagious complaints, *unless* it can be proved that the parturient woman is more susceptible to the influence of the poison of puerperal fever than of any other complaint. No such evidence is, to my knowledge, forthcoming. On the other hand, my own experience, and the usual sporadic nature of the complaint, with only an exceptional and very limited epidemic, suggest an origin, not from previous puerperal fever, but from other conditions and complaints which are capable of exciting it. As, therefore, midwifery is not precluded by attendance on these various poisonous affections, neither should it be by the attendance on puerperal fever.

Of course, it would be folly to deny the communicability of puerperal fever from a puerperal fever patient, or the communication of the malady in its most virulent form by the accoucheur. For instances are on record of medical men, in whose footsteps death has trodden relentlessly, and seized in succession every lying-in woman attended by them, until they have relinquished their work. Here the transmissibility and

the transmission were demonstrated. And here the line of duty is plain. When a man has two or more cases in succession, and he has reason to suspect himself the vehicle of the morbid virus, no considerations of personal financial loss, of undesirable publicity, or of boldness and independent action should be allowed to weigh; but midwifery should be wholly and instantly abandoned. Now it has become a question, not of possible transmissibility, but of certain transmission; not of a sick woman, who may supply a materies morbi, but of an accoucheur who has a fatal supply about himself, and who is as dangerous in his person, his clothing, his instruments, or his methods, to every lying-in woman he attends, as if a puerperal fever patient were placed beside her in the same bed. Midwifery under such circumstances would be no less than murder.

To draw an analogy. Surgical pyæmia is very contagious. Does the surgeon who has under his charge a pyæmic patient, therefore, and of necessity, forbear to operate until this case is well or dead? Certainly not! He goes on with his work, and endeavours to prevent any contagion; but should he discover in his operations a succession of fatalities from this cause, would he not readily lay down his scalpel for a while? So should it be with the accoucheur.

We proceed now to our second inquiry, viz., What evidence exists that, during the conduct of a case of puerperal fever, midwifery may be practised with impunity? As narrated above, four lying-in women have died in my obstetric experience, all from puerperal fever. The first, from septicæmia, lived 57 days, and received 118 visits, or an average of two each day. During its protracted course, three women, previously delivered, were seen 13 times; and 15 others were confined, receiving 108 visits—so that on 121 occasions was I brought into contact with parturient females. The second, from diphtheria, died after 14 days, being seen 24 times. During this period, I paid seven calls to two persons previously confined, and 49 to seven others whom I delivered, making a total of 56. The third, from inflammation (presumably peritonitis), succumbed in eight days, and was seen 15 times. Two antecedent deliveries were seen five times; two confined on the same day, 12 times; one on the next day, six times; and one on the day following, five times—numbering altogether 28 visits. The fourth, from pyæmia, lived for eight months. But after 10 weeks' attendance upon her, I was laid aside myself, and she was kindly taken in charge by a brother practitioner. During those ten weeks, on 63 days I paid 110 visits, and delivered no fewer than 22 other women, seeing them 130 times, and two women, previously delivered, four times, or altogether 134.

Combining the figures, we get the following reassuring result:—At the very lowest computation, I was at the bedside of those infective patients 267 times; and simultaneously was brought, not into proximity, but into contact, with 57 parturient and puerperal women on no fewer than 337 occasions. And with what effect? Not one of them showed symptoms of contamination in any form, nor developed post-partum pyrexia sufficient to justify the term "puerperal fever," or to cause danger or grave anxiety.

This succession of cases demonstrates the possibility of working amidst these organic poisons without transmitting them. And if to

these we add the occasions on which I have seen in consultation, and made complete examinations of, patients with serious puerperal fever under the care of other medical gentlemen, we get some idea of the impunity with which an individual may move amongst the puerperal miasmata, and handle the puerperal contagia, and yet do no hurt to the healthy lying-in woman. In face of such facts, it is surely almost puerile to ask the question—Was it demanded of me that I should not attend those 57 women? The abandonment of my midwifery was evidently not an obstetric necessity. With such a personal experience in the past, am I required in the future, by any law, ethical or professional, to cancel all my obstetric engagements, should some one patient have the misfortune to develop inflammatory or septicæmic or acute specific febrile symptoms? Does consideration for the well-being of a woman, who trusts herself to my care in the critical time of her delivery, if it be reasonable as well as conscientious, demand that she should be transferred by me to other hands? Under such circumstances, I have no hesitation in answering openly and honestly, "it does not!"

Puerperal fever is regarded by some eminent authorities as an excellent name, because it includes all the pyrexias which overtake the lying-in woman, and because it involves no theories. For these reasons, the designation certainly has its advantages for some purposes; but under other circumstances, they are evident disadvantages. If, for instance, it be decided that a medical man, who has under his charge a case of puerperal fever, must not practise midwifery—and puerperal fever includes all post-partum pyrexias—obstetrics will be an impossibility. Such a law will plainly demand a definition of puerperal fever, not quite so general, nor quite so free from all theories. Here arises a great difficulty. The term embraces not one specific entity, as does scarlet fever for example, but a medley of diverse diseases. We have seen from the four cases cited, how it may be a septicæmia, a pyæmia, a diphtheria, or a peritonitis; and, without any doubt, it may be a putrefactive sapræmia, a scarlet fever, a measles, an erysipelas, a metritis, a parametritis, a perimetritis, and probably several other complaints besides. This is sure. The only evidences locally may be a pleurisy, a pericarditis, a pneumonia, or a femoral phlebitis, a so-called white leg, with attendant feverishness. And further, any one of these may exist in any degree of severity, from the least even to the greatest. Are all these puerperal fever? Are all these infectious? If not all, which of them are? With reference to some of them, the answer is easy enough theoretically—those derived from scarlet fever, from measles, from diphtheria, from erysipelas. But, practically, it is very difficult, inasmuch as the origin is often involved in obscurity. Moreover, what evidence have we even then that it is more dangerous than the primary disease from which it was derived? And if it be not, then scarlet fever precludes obstetrics equally with scarlatinal puerperal fever. Again, there is a floating idea to this effect—if the puerpera have high fever, without local symptoms, it is of grave import to her, and serious as regards contagion. But if there be found a collar of cellulitis round the uterus, here is a local explanation of the continued elevation of temperature. The prognosis is more favourable, and the transmissibility of poison is improbable; in fact, there probably is no poison. But on what foundation does such an opinion rest? So far as I can gather,

not on that of fact, but of fancy. A pelvic cellulitis occurring in an uncomplicated labour must be due to absorption of some sort of poison; and that it should be less virulent, in respect of transmission, than that of a puerperal peritonitis or a puerperal pericarditis, is not quite manifest, though it may evidence a more localised absorption.

Frequently after delivery, there is pyrexia; sometimes with a rigor, at others without. We seek the cause, but cannot find it. In a day or two it disappears, or it may last a full week, and range high, and excite our apprehension, and then subside entirely without revealing its origin, or leaving any local sequela. In a few days perhaps it recurs, may be continuous or remittent, may be ushered in by rigors, be attended by variable shifting pains, lasting a fortnight, and after giving the patient a shaking and the doctor a fright, terminate in a complete recovery to both. Where shall we find our working rule, by which to measure the degree of infection in these cases? The directions by which to sift the contagious from the innocent are still to seek. There may be cases, such as the first cited by me, in which, after but two or three days, recurrent rigors render a diagnosis certain, and establish the contagious nature of the complaint; but on the contrary, it would be no modesty in us to allow that, in nine out of ten instances of post-partum pyrexia, we are unable to affirm, in the early stages at least, whether we are dealing with an infectious malady or not. And yet, if it ultimately develop positive symptoms, its virus was as dangerous in our midwifery practice during the first few days of our doubt, as it is now during the period of our certainty. One of my patients lived for eight months; during the last three of which, she was gradually drained to death, by discharging abscesses in the pelvis and the hip-joint. Now we must either insist that infection was present here from first to last, or we must allow some arbitrary line to be drawn, on one side of which is a malignant poison, and on the other side none.

The suggestion may arise in our minds, that these difficulties propounded are but captious quibblings. To me, they are far different. They are problems demanding solution, if puerperal fever is to preclude midwifery. We must know what we mean by the phrase; otherwise it means nothing, and the law cannot be interpreted; or perhaps we might say, can be interpreted anyhow. If, whenever a puerperal pyrexia creates anxiety, we cease our obstetric work, this will be an absurdly irregular department of our practice; and if we defer our decision as to the existence of puerperal fever until the case has become critical or hopeless, and not until then take steps for self quarantine, we shall have run the risks of transmitting the disease while the risks were greatest, and have instituted our precautions when probably these were the least required.

The conclusion at which I arrive is this:—A medical man should recognise the special susceptibility of the lying-in woman to the pernicious influence of all animal poisons. He should therefore in every midwifery case exercise care, lest these gain entrance to her system, by adopting simple routine protective measures. Whenever he has under his charge a case of infectious or contagious disease, whether this be medical, surgical, or obstetric, *e.g.*, scarlatina, pyæmia, or puerperal fever, he should regard himself as a possible vehicle of transmission or contamination, and should consequently use extra care

in the employment of precautionary means. But if in his midwifery, a succession of two or more cases of puerperal poisoning occur, between which he is certainly or probably the connecting link, since it is here not a question of possible transmissibility of virus, but of its transmission, not of an infective patient, but of an infecting practitioner, obstetric practice should be instantly and wholly abandoned.

By this course the fears and endeavours of the medical man will not be focussed solely on puerperal fever, while he overlooks or too lightly regards the equally grave and far more numerous dangers lurking in the multitude of septic medical and surgical maladies with which he is so frequently associated. The terror investing puerperal fever, which is a foolish timidity, will be toned down; and the apathy regarding eminently poisonous common complaints, which is a foolish temerity, will be corrected, and the life of the mother, which for so many reasons should be specially sacred to us, will be preserved.

SOME REMARKS ON THE ADMINISTRATION OF ANÆSTHETICS DURING LABOUR.

By S. Maberly Smith, M.R.C.S. Eng.

I propose to submit to your consideration a few points on this subject, based on an experience of about 500 cases of midwifery, in which an anæsthetic has been given, either in small quantities to diminish pain, or more fully to produce insensibility.

Most authorities, who have written on the administration of anæsthetics in natural labour, speak of it as an unqualified success in all cases; some of the older writers have equally condemned it. My experience has been, that the results of this practice vary in all degrees from a brilliant success to a miserable failure, owing to the very different effects produced on individuals.

As to the best Anæsthetic to be Employed.

In most cases, the A.C.E. mixture acts admirably in stopping the sensation of pain, and is then to be preferred from its safety. But there are some patients on whom, from various causes, the mixture is not sufficiently quick in its effect to dull the pain, and in these cases chloroform is preferable from its more rapid action. I have, on various occasions, found the latter succeed, where the A.C.E. mixture has given little relief. It is here presumed that the anæsthetic is given at the beginning of each pain, and removed when it ceases.

Where complete insensibility is required, the A.C.E. mixture still seems to be the best agent, or rather, I should say, the A.E.C., which is the combination I use in midwifery. Of other narcotics, bichloride of methylene does well. Æther is too slow in its action, and escapes so much about the room; there is also some risk of fire in these cases.

Of the Risk to Life.

Though there is undoubtedly much less danger in giving anæsthetics to pregnant women than to others, from the position of the patient, the small amount given at once, where it is administered only to deaden pain, and the special immunity from heart failure enjoyed by persons in this condition, still I believe that some risk does exist, and that this risk is generally under-estimated. Though I do not personally know of a death under these circumstances, several of my patients have exhibited alarming symptoms, and medical friends have had the same unpleasant experience.

In the *British Medical Journal* of 1878, Dr. Lusk, of New York, records five cases in which an anæsthetic was given during labour. In two of these, death took place immediately; and in the other three, the patients were saved with great difficulty. There are other cases recorded where death took place some hours after the labour, and therefore where it is doubtful whether the narcotic was answerable for the fatal result.

I attended a patient in four consecutive confinements. On each occasion she took the A.E.C. mixture to relieve pain only, and therefore in small quantities. Twice she took it well; the third time she exhibited most alarming symptoms of heart failure; on the fourth occasion she insisted on having it again, and this time there was no trouble.

I think this element of danger is an important point. In various places, I have seen anæsthetics administered with the greatest carelessness, under the belief that a woman in labour cannot be so killed.

The Question of Patients Talking Whilst Under the Influence of an Anæsthetic.

Writers on the subject seem to confine themselves to the discussion, whether women in this state do or do not talk indecently. Some have said that, where an anæsthetic is given only to relieve pain, the amount inhaled is so small that the talking stage is not reached. From my observations, patients very seldom do make these remarks, though I have not had quite the same experience as Simpson, who says that they never do. When they do so it is caused, I think, by the act of vaginal examination; and anything unpleasant in this way can be avoided by always allowing a full return to consciousness before an examination is made.

As to the amount of vapour inhaled being too small to cause talking, there are women who lose control of their speech with the least inhalation. But, though women in this state seldom speak indecently, they frequently say very foolish things, will tell the greatest secrets, and will answer, generally truthfully, any question put to them. They will quietly, and being apparently to non-professional by-standers in their right senses, make statements damaging to themselves and others; statements which have no foundation in fact, and which I am convinced have no existence in their minds when conscious.

I am aware of two cases in which trouble arose in this way. In one, there was the unfortunate combination of a woman who talked with the smallest whiff of an anæsthetic, a mischief-making nurse, and a jealous

husband. The semi-conscious patient made some foolish remark to the doctor, this was duly carried to the husband, there was trouble, and the doctor was never called in again.

Some years ago a well-known man was found drowned under suspicious circumstances. Though great efforts were made by the police, no one could be found who had seen the deceased after a certain time at night, though he was believed to have been alive some hours after. Some time after this occurred, I had to attend a woman, who was a stranger to me, in her confinement, and as she was suffering severely, I administered small quantities of chloroform. Under the influence of this, she began to talk quietly and rationally about the man who had been drowned. She gave a complete history of him from the time that he was last seen by the witnesses at the inquest almost till his death, stating that she had been with him all the while. When this patient was well, I told her what she had said. She was very frightened, and was totally unconscious of having said anything, but admitted that her statement was in every particular true. I mention this case as an example of the revelations which may be made by a narcotised patient. Certainly one should be most careful that a woman in this condition does not damage herself or others by her statements.

Twice after administering the A.E.C. mixture, I have seen the condition described by Dr. Tom Bird as æther mania—that is, that long after the inhalation has ceased, perhaps for hours, the patient will go on unconsciously saying anything that comes into her head.

This matter of talking is so much more important in these cases of anæsthesia than in all others, because in these the patient is kept constantly at the talking stage, whereas in others the state of silence is soon reached.

Of the Effect of an Anæsthetic on Others in the Lying-in Room.

A drawback to the administration of an anæsthetic in some cases seems to me to be this :—Where it is given for a prolonged period to deaden the pains, and when finally some operative measure has to be resorted to, the effect of the vapour on the medical attendant may be such that he is not in the best condition, mentally and physically, to undertake a critical delivery. He is to a certain extent unnerved, his head is not thoroughly clear, and muscularly he is rendered weaker. At all events, I have experienced this condition personally so often that I think there must be others who have been similarly affected. In some rooms, and under some circumstances, it is impossible to ventilate so that the fumes of the anæsthetic are all carried away. Others may be also affected.

I attended a lady in a severe labour where chloroform was used. During its progress, her husband came into the room several times. He became very curious in his manner, and after the case terminated, I found him in another room quite hysterical. Though a perfectly sober man, he was suspected of being drunk at this time. In another case, I had to get the assistance of the husband in a chloroform case. He was a very strong able-bodied man, but after being in the room a short time, he began to cry, and behave much as the man in the other case. Both these men were aware of being affected by the anæsthetic

vapour. I have never seen mother or child affected after the confinement. Women in labour must have an exceptional freedom from the sequelæ of anæsthesia, though some cases of vomiting are recorded.

Do Anæsthetics Tend to Produce Post-Partum Hæmorrhage?

There is much difference of opinion on this question; some authoritie go so far as to say that they prevent it. My belief is, that they have this tendency to cause bleeding. In looking over a record of about 4000 cases, the constant relation between the use of anæsthetics and hæmorrhage is striking. To any woman who has a predisposition to bleed, the smallest amount of any of these agents adds to her danger. Unfortunately in first cases, and often in others, one cannot usually foretell this predisposition. There is however one guide, I think, that is, that there is a pretty frequent relation between those who suffer from menorrhagia and those who flood, though it is by no means constant. If I know that a woman has habitually menstruated excessively, I never, if possible, give her an anæsthetic. The chance o post-partum hæmorrhage occurring increases with each labour, and that risk is proportionately made greater by anæsthesia. If I can avoid it, I do not give inhalations simply to relieve pain after the first case, specially as there is usually less need. But here there arises one of the drawbacks of this practice. After once having a narcotic, patients often insist on a repetition of the practice on all future occasions, yet some special risk may have been disclosed from a former experience. If a woman knows she has to bear the pains of labour, and thinks there is no way of escape, she will bear them bravely; whereas, if she has once had an anæsthetic, she is a coward without it in many cases.

Of this I am sure, that whether there is post-partum hæmorrhage or not, after-pains are very frequently caused by anæsthesia, even in first cases; that is, that though relaxation of the uterus, sufficient to cause severe bleeding, may not occur, yet there is enough to allow oozing into the uterus, causing clots.

Of the Effect of this Form of Narcosis in Relaxing the Soft Parts.

As a general rule, anæsthetics have a powerful and rapid effect in relaxing the os, but not always. I have seen the deepest anæsthesia fail to do this. I think that the thick rigid os withstands the effect more than the thin rigid one, and primiparous cases than multiparous. In cases where the rigidity will yield to nothing else, I have found hypodermic injection of morphia succeed. Inhalation always relaxes and moistens the rigid perinæum to some extent, and generally in a very marked manner.

The Use of Chloral in Labour.

On the whole, my experience of chloral has not been satisfactory. In some cases, doubtless, it relaxes a rigid os; in many, it fails. In a large number it causes vomiting, and, I believe, sometimes relaxes the rigid os by its emetic action. It is, in my opinion, more dangerous, given in repeated doses, than a general anæsthetic. I have seen two deaths from moderate doses, but not in parturient women. I attended a

patient in labour with a rigid os; twenty grains of chloral were given in Liebreich's Syrup. Twenty minutes after, the os not having yielded, the dose was repeated. The woman then got into the most alarming condition with the symptoms of chloral poisoning, and was with difficulty saved.

Patients made semi-unconscious, sometimes become very noisy and unmanageable; in this case, it is better to stop the inhalation, however much they object. Giving an anæsthetic for natural labour is often a severe tax on the medical attendant. However tired he may be, he has to sit perhaps for hours watching for the commencement of each pain, to give the looked-for whiff—the more tempting process being to go to sleep in another room.

The cases above all others in which anæsthesia gives relief, and does direct good, are those in which there is one continual pain without cessation, pain peculiarly hard to bear and nearly useless, caused by irregular contraction of the uterus. A few inhalations make a complete change, the pains become bearable and defined, there is the regular rise and fall with an interval, and the labour progresses.

In conclusion, I would advocate the use of anæsthetics in operative midwifery, and in natural labour, where it is required, and where it is practicable. I say, where practicable, because there is a vast difference between giving them where there is the assistance of another medical man, or of a skilled nurse in a town, and being away in the bush with practically no help, and where the proceeding may be strongly objected to by the friends. In such cases, it is often better to do without them.

In natural first confinements, I would administer an anæsthetic for any of the following reasons:—Either that the patient desired it, or that the pain was excessive, or to relax the soft parts. In natural multiparous cases, I would not give it if I could avoid doing so. In all operative cases I would give it, except where forceps are used with the head on the perinæum, when it is not required, unless the perinæum be rigid and dry, then the practice is invaluable.

DISCUSSION.

Dr Balls-Headley agreed with Dr. Verco's conclusions, but pointed out the necessity of practitioners taking every precaution to protect themselves against dangers of transmission. He recommended even so strong an antiseptic as a solution of corrosive sublimate of ten grains to the pint. It must be noticed that Dr. Verco's statistics were those of private practice, and so were different from those of hospital practice. The common cause of so-called puerperal fever was the transmission from one septicæmic patient to another. Antiseptic midwifery prevented septicæmia. The lines of temperature in hospital charts before and since the introduction of antiseptic treatment, undoubtedly proved this.

Dr. Brummitt had had a fairly wide experience in the country, having attended 1000 cases of midwifery during the period covered by

Dr. Verco's paper. He had seen only one case of true puerperal fever, a fatal one, in a house which contained a case of malignant diphtheria. The degree, with which lying-in women suffered from proximity to contagion, varied. He remembered finding a child with typhoid lying in bed alongside its recently confined mother. The woman escaped scot-free with a straight line temperature. Another child (in a different case) had scarlatina, without in any way affecting the mother. In his district, he had known no year free from zymotic disease; but as far as he knew, it had not affected lying-in women.

Dr. Eugene Anderson, Resident Medical Officer of the Women's Hospital, Melbourne, pointed out that from May 1877 to August 1888, there had been 688 women confined in the institution; and that of the four deaths that had occurred among them, only one was due to puerperal fever. This, he thought, proved that he himself, combining as he did the dual duties of infirmary and midwifery departments, had conveyed no puerperal fever to his lying-in patients. The strictest antiseptic precautions were observed. He laid great stress on thoroughly cleaning the nails with a nail brush. He mentioned the case of a woman who had been brought to the hospital with scarlatina, and though she was seen (necessarily) in the first instance by nurses, no harm had ensued.

Dr. Worrall agreed with the conclusions of Dr. Verco, provided rigorous antiseptic measures were adopted, as indicated by Dr. Balls-Headley. He thought that Dr. Verco had proved that other forms of blood-poisoning than puerperal fever may occur from contagion.

Dr. J. W. Dunbar Hooper could speak from his experience as a previous Resident Medical Officer of the Women's Hospital for two years, and a member of the present Honorary Staff of the Midwifery Department. He agreed with Dr. Verco, provided antiseptic precautions were employed. He had seen a woman affected with puerperal fever lying in the same ward as another not so affected, without communicating puerperal fever to the latter. He thought a good deal of harm was done by ignorant midwives, who should be made to pass examinations, and show their knowledge of the use of antiseptics.

Mr. E. M. James agreed with Dr. Hooper, and approved of the registration of midwives, and of cases also. Puerperal fever cases should be traced. He believed that lacerations of the cervix, by presenting a solution of continuity, were a cause of fever by absorption.

Dr. Nyulasy asked if Dr. Verco believed that bad drainage was a cause of puerperal fever.

Dr. Meyer, as one of the present Honorary Staff of the Midwifery Department of the Women's Hospital, and a previous Resident Medical Officer of over four years' standing to that institution, could agree thoroughly with Dr. Verco.

Dr. Bright, of Hobart, differed from the voice of the meeting. He thought that where a medical man had a case of puerperal fever, he should give up attendance on his other patients for at least a month, especially in towns.

Dr. Batchelor pointed out that we must not overlook the possibility of mischief existing in a patient before the onset of puerperal fever. In Dr. Verco's first case, the mischief might have been tubal. In the second case, the unilateral pain pointed to tubal mischief. These causes

might account for a good many sporadic cases. He wished to correct an erroneous impression in Dr. Verco's mind, that he (Dr. Batchelor) did not believe in the existence of pelvic cellulitis. He did say such a condition was excessively rare, except as an accompaniment of acute general septic conditions. He thought the term, "puerperal fevers," was better than "fever."

Dr. Verco, in reply, was very thankful to the members for their cordial support of his views. He had feared opposition. He wished it to be understood, that he did not say that puerperal fever cannot be conveyed from one patient to another. He never attended a case without previous disinfection; even if the child had been born before his arrival, he used antiseptic measures before commencing treatment. We might for our own peace of mind (in the face of puerperal fever developing in a patient), hand over our cases to a brother practitioner. Such a proceeding would be all right, if we knew that he had nothing likely to be a source of contagion; on this point, we could not be sure. In reply to Dr. Nyulasy, he thought bad drainage a likely cause of puerperal fever.

A CASE OF UTERINE PREGNANCY SUPERVENING ON ECTOPIC GESTATION, WHICH HAD PERSISTED FOUR YEARS.

By Thomas Chambers.

Lecturer on Midwifery and Diseases of Women at the Sydney University. Senior Physician to the Department for Diseases of Women at the Sydney Hospital.

Mrs. M., æt. 32, mother of three living children, youngest two years old; always had lingering labours. She engaged Dr. Jones, of Ashfield, to attend her fourth confinement, which was expected in March 1884. When two months pregnant, she had a severe attack of pain in the right iliac region, which passed off in about a week without any special treatment beyond rest and sedatives. When four months gone, she went to Grafton by sea, and soon after her arrival there she was seized with very severe crampy pains in the right side, and urgent vomiting, which kept her in bed about a month, fixed on her right side—this being the only position compatible with anything short of the severest agony.

In the early part of the sixth month, when preparing to return home, another attack of severe pain and vomiting came on, which prevented her return. From this time the attacks were frequently repeated, with more or less severity, until the full term of gestation was completed, when strong pains, similar in all respects to her former labour pains, came on, and continued for forty-eight hours. She herself believed, and the doctors (three) who attended her believed her to be in labour.

At the end of forty-eight hours she had a severe attack of faintness, with loss of vision and a sense of approaching death, with a very peculiar fluttering, as if something was loosely moving about in the abdomen. At this time several attempts were made to deliver her, but, I need scarcely add, without success. These unpleasant symptoms gradually subsided, when a discharge of blood from the vagina appeared, much in the same way, and in about the same quantity, as had followed her former confinements. Several clots were passed, one being specially noticed from its peculiar formation and density, having the length and outline of a child's forearm.

By the end of the tenth week she had recovered sufficiently to enable her to return home, when she again came under Dr. Jones's observation, and shortly after her return I had an opportunity of seeing her with him. She could now get about her house, and attend to her family affairs without pain or discomfort.

The lower zone of the abdomen was occupied with a globular tumour, resting on the pelvic brim, inclining decidedly to the left side. It was spherical in outline, perfectly smooth on its surface, with a boggy feel closely resembling a dense colloid tumour, but by deep pressure the fœtal outline could be clearly traced. The tumour, which had a diameter of seven and a half inches, was to some extent movable—that is, it moved like a body anchored to a fixed point.

The inference was, that it had formed attachments to the antero-lateral aspect of the abdominal peritoneum. The uterus was normal in size, but the fundus was less movable than the cervix and body.

As she felt herself to be in good general health, and able to attend to her domestic affairs, she absolutely declined to submit to any surgical interference ; and although she was warned as to the risks involved in delay, she stoutly resisted any operative procedure.

The patient continued to enjoy excellent health up to the end of the year 1887, when she again consulted Dr. Jones, believing herself to be pregnant. This belief was confirmed by Dr. Jones, and she continued pretty well until the early part of June 1888, when she had an exhausting attack of diarrhœa and vomiting, accompanied by severe abdominal pain. The abdomen was greatly distended and very painful, with great mental depression ; and her sufferings were so acute and exhausting, that she earnestly desired something might be done to relieve the painful distension.

I saw her in consultation with Dr. Jones on June 21, and found the aspect of affairs greatly changed since my last visit. The severe attack of diarrhœa and vomiting had much exhausted her, the abdomen was distended to an extreme degree, and exquisitely sensitive, even to the most careful manipulation. The uterus was placed obliquely across the abdomen, with its fundus directed towards the spleen ; the dorsum of the child lying immediately under the median line, with its head resting against the right ilio-pectineal ridge. The tumour was lifted completely out of its original position, and relegated to the right hypochondriac region, immediately under the liver. Per vaginam, the cervix uteri could be easily reached by the examining finger, the os uteri was sufficiently patent to admit the finger, and the cranial arch could be felt resting against the right half of the pelvic brim. No trace of the tumour could be felt within the pelvic area.

The important question now to be determined was—What was best to be done in the interests both of mother and child? That something must be done was clearly manifest. Upon which factor should we act? Upon the tumour, leaving the uterus and its contents intact; upon the uterus, leaving the tumour for a future occasion; or should we leave both alone, and let nature take her own course? If these important questions could have been discussed under less urgent and more favourable circumstances, the difficulty would have been reduced considerably.

Having carefully considered the unfavourable circumstances surrounding the case, the condition and position of the uterus and its contents (the evident indications that nature had already determined the question as to which factor she intended to act upon, in order to relieve herself of an insupportable burden), the changed position of the tumour, the great uncertainty as to its attachments, as well as the difficulty of dealing with it under existing circumstances; having, I say, carefully balanced these several risks, we came to the conclusion that, if one course offered fewer risks than another, it was to follow the manifest indications of nature, viz., to empty the uterus by the induction of premature labour. The fœtus having passed the seventh month of utero-gestation, and as its heart sounds counted 144, a female was diagnosed, which was regarded as a favourable element in the case.

On June 23, Dr. Jones passed a soft gum elastic catheter up between the uterine wall and the membranes; labour pains came on with increasing regularity and force in about twenty hours, and a living female child was born twenty-four hours after the introduction of the catheter. Post-partum hæmorrhage necessitated the mechanical removal of the placenta, after which the uterus contracted pretty firmly. I saw the patient four hours after the child's birth; the uterus had relaxed considerably, and its cavity was distended with coagula, which were removed by gentle compression, and the uterus and the vagina were well irrigated with vinegar and water, after which the uterus contracted fairly well.

The abdomen was a good deal distended and painful: pulse 120, lessened in volume; temperature 101·4°, and respirations 28. The face was pinched and anxious, and the skin covered with perspiration. These early symptoms pointed to peritoneal irritation of an asthenic type, and to a doubtful prognosis. Next day, the symptoms which usually characterise asthenic puerperal peritonitis were in full force—viz., abdominal distension, acute pain, urgent vomiting (green vomit), exhausting diarrhœa, dry tongue, urgent thirst, high temperature 103·5°), quickened pulse without power (132), shallow respirations (36 to 38), great facial anxiety, and fixity in the dorsal decubitus, with flexed lower extremities.

In this condition she continued, fluctuating from day to day, until Saturday, June 30, when she quietly succumbed, just a week from the introduction of the catheter.

A post-mortem examination was made about eighteen hours after death by Dr. Wilson, Pathologist to Prince Alfred Hospital, and Demonstrator of Anatomy at the Sydney University. The peritoneal cavity contained a quantity of dark grumous fluid, mixed with lymph shreds and pus. The peritoneum around the cæcum was much congested,

and studded with dark patches of effused blood. The uterus was well contracted, and had descended well into the pelvis, although its sinuses contained pus. The tumour extended upwards to the ninth rib (right side), overlapping the ascending colon, to which it was attached by recent adhesions; it was also connected by fibrous bands, of old standing, to the meso-colon and small intestines. In the immediate vicinity of the tumour, the coils of the small intestines were matted together by recently effused lymph, at a point where the sac containing the fœtus had given way, apparently from ulceration, and the cranial bones were protruding through the opening. The tumour was anchored to a long pedicle, which appeared to have undergone gradual elongation, by the enlarging uterus exercising continuous upward pressure upon it. The pedicle was triangular, having a very broad base, which involved the right broad and round ligaments, the right Fallopian tube and ovary, the round ligament forming its right free border. The sac, uterus, and appendages were removed, and carefully examined by Dr. Wilson, who, in answer to a list of questions, kindly replied as follows:—(1) Character of cyst and its site—originally tubal, now in the folds of right broad ligament. (2) The containing sac is too much condensed to say whether it consists of the original membranes; but the lining membrane is, in part at least, original. (3) Right ovary is intact, and appears to be atrophied; the right tube is intact from the cyst to the fimbriated extremity; the proximal uterine part is atrophied and closed. (4) I am of opinion that puerperal peritonitis, together with septicæmia, were the causes of death, and think it probable that the peritonitis preceded the septicæmia, though it may have been otherwise. (5) I do not believe that, apart from the subsequent septic infection, the cyst contents which escaped into the peritoneal cavity were the causes of the peritonitis; but they may have been predisposing causes. (6) The fœtus belongs to the macerated variety. (7) The left ovary contained a corpus luteum.

Having already occupied more of your time than I originally intended, I will not trespass much longer; but I cannot refrain from offering a remark or two. In the first place, it may be asked—What were the causes of the severe pains at the end of the second month? I am inclined to the opinion that partial rupture of the muscular wall of the tube occurred, while the ovum remained intact, and if the true cause had been recognised, it would have been good practice to have performed laparotomy, and cleared out the peritoneal cavity. Then, with respect to the formidable array of symptoms which presented themselves at the end of the fourth month, it may be fairly inferred that a second and more extended rupture occurred, but did not involve the amniotic coat on the placental site, at any rate to any considerable extent. Laparotomy would, at this juncture, have been in accord with modern views, if the nature of the case had been made out; but extra-uterine gestation does not appear to have been suspected, notwithstanding the presence of a characteristic symptom, viz., a sanguineous discharge from the vagina, more or less continuous.

What were the precise changes which took place after the cessation of the labour pains, when the faintness, loss of vision, and a sense of impending death—with a feeling as if something was moving loosely in the abdomen—occurred, it is difficult to conjecture? The patient

was satisfied that the child was alive previous to this attack, but did not feel its movements after the urgent symptoms had passed away. It is, however, within the range of possibility that the membranes were more completely ruptured than heretofore, permitting the escape of the liquor amnii, and perhaps the child, in part, into the abdominal cavity; that the child died; and the ruptured cyst was repaired by the inflammatory changes that supervened. With respect to the clot passed per vaginam, of peculiar formation, size, and density, having the length and outline of a child's forearm, we may fairly assume this to have been the uterine decidua, although it does not appear to have been recognised by the medical men in charge of the case.

When the patient returned from the country, her general health had so much improved, and her personal inconvenience was comparatively so little, that she positively declined to permit of any surgical interference, although it was represented to her that the retention of the tumour might eventually prove to be a source of danger. While, in some cases, toleration of a gestation sac may be established after the sac and its membranes have become calcified, and may be retained, as an inert body, for a long series of years,—(Sappey met with a case where a fœtus had been thus retained, in this way, for more than half a century)—nevertheless, it is well-known that this process of calcification, even when established, is often imperfect, and the sac may rupture inopportunely, and prove disastrous to the interests of the unfortunate patient. Hence, it is a wise precaution to remove the tumour when a favourable opportunity offers. It is quite possible that rupture would not have taken place in this case had not uterine pregnancy supervened.

But the most important questions yet remain to be noticed, viz.:—What was the best course to adopt when interference became a necessity? Upon which factor ought we to have acted? Upon the tumour, or upon the uterus? These are important questions, upon which I should be glad to hear an expression of professional opinion, especially as we possess so little information as to the best method of dealing with cases of this kind; indeed, I have not been able to find a similar case on record.

Looking at the case from an after-event point of view, it may be said that, to have removed the tumour, as we should an ovarian tumour complicating pregnancy, would have been the best mode of treatment. I was not of this opinion before the event, nor am I now, and for the following reasons:—

(1) Because the uterus had evidently made preparation for relieving itself of its contents, as indicated by the conditions already mentioned, and I am one of those who hold the opinion that in cases of perplexity we should, if possible, ascertain nature's plan of dealing with her difficulties; and if her method is practical and reasonable, we should, as far as possible, aid her in carrying out her conservative designs.

(2) Because we have the fact on record, that toleration of an abdominal gestation sac may have become so well established, that labour, even at full term, may be completed without injury to the sac or its contents, even if the uterine gestation is several times repeated

(3) Because I believed the patient's general condition and surroundings were exceedingly unfavourable for abdominal section—a belief which was well sustained by the after-death examination, which revealed the facts that the fœtus belonged to the macerated variety; that the sac had given way, and its fluid contents had escaped into the peritoneal cavity. How long the cyst had been ruptured could not be ascertained; but it may reasonably be inferred, that the escape of the fluid contents of the cyst into the abdominal cavity was the exciting cause of the exhausting attack of diarrhœa and subsequent peritonitis, which contributed so materially to the disastrous result.

If rupture of the sac could have been diagnosed, then abdominal section should have been undertaken immediately, notwithstanding the unfavourable circumstances surrounding the case.

A MODIFICATION OF MARION SIMS' OPERATION FOR METROTOMY.

By George Rothwell Adam, M.B., Ch. M. Edin.

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It is not within the scope of this paper to enter upon a discussion on the merits of metrotomy; suffice it to say, that the operation has now been thirty years or more before the profession, and is still extensively practised in some form or other. My aim is rather to bring the operation up to the scientific requirements of the day, and thereby reduce its possible dangers to a minimum.

The patient is directed to have the pudenda, including the inside of the thighs and each groin, thoroughly well washed with soft soap and hot water, the vagina to be syringed out with water as hot as can conveniently be borne, the night before, and the morning of the operation.

The patient is placed in Sims' position on a stout table. The pudenda, insides of thighs and groins, are then well washed with a 1—1600 solution of perchloride of mercury, diluting the solution to about half this strength to syringe out the vagina. The instruments and sponges are kept in a 1—20 solution of carbolic acid. A Sims' speculum, or what I prefer for vaginal surgery, Semon's perineal retractor, is then introduced, the cervix brought into view, and seized with a vulsellum, which is steadied by an assistant.

An attempt is then made to introduce a sound through the cervical canal into the uterus, in order to ascertain the lie of the uterus, the condition of the cervical canal and internal os. If the external os is so narrow that a sound cannot enter, its posterior lip may be incised by a curved sharp-pointed bistoury.

The posterior wall of the cervix is then divided at one cut with a pair of Hart's scissors, nearly up to the vaginal roof. The hæmorrhage is usually slight, but after sponging, bleeding points are easily seen and secured by pressure forceps. General oozing is readily controlled by a stream of hot corrosive solution. The tip of the left forefinger is now pushed up the canal as close to the internal os as possible, and a curved probe-pointed bistoury is slipped along it through the internal os, and its superficial fibres lightly notched, anteriorly and posteriorly. I then enlarge the internal os, by stretching it with a four-bladed dilator with spring handles, which enables the operator to accurately gauge the amount of tension used. The vagina is again washed out, and all clots removed by careful sponging. Three or four sutures are now introduced into each half of the divided cervix, so that the endo-cervical mucous membrane is united to the mucous membrane on the vaginal aspect of the neck of the uterus, thus practically covering in the cut surfaces of each half of the divided cervix. For this purpose, I use curved needles on long handles, similar in pattern to those employed in the operation of cleft palate. No. 3 silver wire makes a good suture, being pliable and sufficiently strong, as there is little strain on it. It is well to leave the ends long enough to reach to just within the vaginal outlet, taking care to bend up the points in order that the vagina may be uninjured. In this way, the removal of the suture is more easily effected. The vagina is now thoroughly washed out with corrosive solution, carefully sponged dry, and packed with absorbent iodoform wool. The whole operation need not occupy more than twenty or twenty-five minutes. The after-treatment consists in keeping the patient in bed for seven or eight days, after which she may be allowed to get on to a sofa, and on the fourteenth day she is usually convalescent.

I remove the vaginal packing on the second day, and have the vagina then daily washed out with hot carbolised water until after the sutures are taken out, which is done on the sixth or seventh day. The advantages of this method of performing metrotomy are:—(1) It is aseptic, in so far that the vagina is thoroughly cleansed, and the cut surfaces are closed in and encouraged to heal rapidly. (2) Hæmorrhage is effectually controlled by the fact, that those parts from which any considerable bleeding can occur are brought within easy view, and secondary hæmorrhage is obviated by the closing in of the cut edges. (3) The object of the operation is more effectually carried out, inasmuch as closure of the cervical canal is abundantly provided against by the forcible tearing of the superficial muscular fibres of the internal os (which act as a sphincter) and the suturing of each half of the divided cervix. (4) It is in accordance with modern scientific requirements, whereby the sense of touch is not alone unnecessarily relied on, but a precision is given to the carrying out of details which other methods in vogue do not possess.

The homely adage, "the proof of the pudding is in the eating," is axiomatic; so in surgery, an operation must be known by its results. Of five cases I have done by this method, two were where sterility was the prominent trouble, and in both instances the result justified the procedure. The other three were for dysmenorrhœa. In two, the relief was all that could be desired; in the third, the result was a failure, probably due to want of care in selecting it as a suitable case for

operation, as there was a fibroid growth in the posterior wall of the uterus, on which I now think the dysmenorrhœa depended. Not one of these cases gave me the least anxiety during convalescence. The temperature and pulse, after the reaction from the operation subsided, continued normal throughout, and the patients suffered no incovenience beyond the confinement to bed. In contra-distinction to this, within the past year I have seen three cases, in which the metrotome was used, do very badly. One had alarming hæmorrhage; the other two were confined to bed for many weeks with a sharp attack of peri-uterine inflammation.

In conclusion, I would say that any who may try this method of doing metrotomy will find it a distinct advance on the ordinary methods in vogue.

THE MENSTRUAL FUNCTION—ITS INCEPTION, DURATION, AND CESSATION, COMPARATIVELY CONSIDERED.

By Eugene Anderson, M.D., B.S. Melb.; L.R.C.P. et S. Ed.

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In casting round for a subject worthy the attention of so important a meeting of the medical profession as this, it occurred to me that a consideration of some points connected with menstruation might be of interest, especially if those points were particularly worked up from an examination of the surroundings of that function as exhibited by those born in the colonies, as compared with those born in the United Kingdom. For this purpose, I have taken the records of the Women's Hospital, Melbourne, and from over 1200 cases I have drawn out the following results and conclusions.

Comparatively, I have also considered throughout the differences which exist in the performance of this function, when it is first established, and later, in more mature years, when marriage and child-bearing have in most cases brought their influences (if any) to bear.

I have taken particular note of the following points, viz.:—The age at which menstruation is established, its regularity or otherwise, the number of days which the flow lasts, the amount of accompanying pain, the age at which menstruation ceases, and the duration of menstrual life.

These points I desire to now shortly bring before this Congress, hoping that this paper may shed some few rays of light on this important function:—

The Average Age at which Menstruation begins.

In 1220 cases, the average is 14·71. The whole of these were born in the colonies, with the exception of 132 cases, in which the age was 14·73. The average mean temperature of Melbourne is 57° F., and of the capitals of all the colonies it is 60·5°, while that of

Great Britain and Ireland is 45·4°; thus a difference of 15° in temperature is accompanied by an earlier onset of the flow of only ·02, or one week less than is, I think, ordinarily supposed to be the case. Hart and Barbour give from 13 to 15 as the usual age for the home country; while Playfair states that, in temperate climates, it generally commences between the fourteenth and sixteenth years, and is somewhat earlier in tropical, and later in very cold countries. My number of cases is certainly not large, but, as far as they go, tend to show that the difference is not so great, according to temperature, as is often ascribed to this influence.

A few particulars are given of the most notable cases met with in my examination of our records. Thus the earliest age at which menstruation commenced was 8½ years. This woman was regular from the start; married at 19, had one child, is 30 now, and is irregular, with a 7 to 8 weeks interval. In another case, æt. 25, the menses have never appeared; married at 18; has never been pregnant; no treatment was considered necessary; uterus and ovaries present. Another, æt. 34 now; is married; never has been pregnant; menses have never appeared, though there is no pathological condition to account for their absence. Another, æt. 18 now; no menses have appeared; was married at 16, and has had two children, the last very recently. This is a curious case, and it would be interesting, if her history could be followed, to see if they appear later.

Of 1160 cases—1 began at 8½, 7 at 10, 20 at 11, 91 at 12, 154 at 13, 267 at 14, 254 at 15, 164 at 16, 109 at 17, 54 at 18, 13 at 19, 12 at 20, 3 at 21, and 2 at 23.

(*a*) *Question of Regularity, or otherwise, at Inception of Menstruation.* In 1170 cases, 308 or 26 per cent. were irregular then, while 862 or 74 per cent. were regular. The average age at which menstruation began in those who were irregular was 14·82, or ·11 higher than the general average—a slight indication that late appearance rather predisposes to irregularity. I find that in 1177 cases, the average number of days which early menstruation lasts is 4·42 days.

(*b*) *Amount of Pain with Early Menstruation has been considered as None, Some, Great, and Very Great.*

Out of 1144 cases:—

No pain occurred in	484,	or 42	per cent.
Some ,, ,,	352,	,, 31	,,
Great ,, ,,	289,	,, 25	,,
Very great ,,	19,	,, 2	,,

(*c*) *Amount of Flow in Early Menstruation is Grouped under the Heads of Very Scanty, Scanty, Usual, Free, and Very Free.*

In 1109 cases:—

Very scanty in	34,	or 3	per cent.
Scanty ,,	235,	,, 21	,,
Usual ,,	450,	,, 41	,,
Free ,,	346,	,, 31	,,
Very free ,,	44,	,, 4	,,

While working out these results, I thought it advisable to enquire if scanty or very scanty flow is associated with more pain than when the

amount is usual or free, and found, from a consideration of 228 cases, that scanty flow is associated with more pain in 9 per cent., while very scanty flow is accompanied by very great pain in 21 per cent. more (33 cases) than the average.

Later Menstruation.

The average age (of 940 cases) at which this is taken is 31, and the percentage of married to single women is 80 per cent. to 20 per cent.

(1) *Its Regularity, or Otherwise.*

In this, I have taken every woman as regular who menstruates every 2, 3, 4, 5, or 6 weeks habitually.

In these 940 cases, 65 per cent. are regular, and 35 per cent. irregular. Comparing this return with the results obtained in early menstruation, it will be found that 9 per cent. more are regular in their early, than in their late performance of the function; tending to show that, in later life, menstruation is a good deal more likely to be irregular, than at its onset.

Hart and Barbour state that it is regular in 87 per cent. when once established. I suppose the discrepancy in these returns is due to the fact, that Hospital patients are so often affected with various uterine and ovarian troubles, which tend to cause irregularity.

(2) *The Frequency of Later Menstruation.*

In 621 cases who are regular :—

29	menstruate	every	2	weeks,	or	5	per cent.
88	„	„	3	„		14	„
471	„	„	4	„		76	„
8	„	„	5	„		1	„
25	„	„	6	„		4	„

Thus, three-quarters of all those who have any regular interval are unwell every 4 weeks, while every 3 weeks is by far the next in frequency. Seventy-one per cent. of all women are stated to menstruate every 28 days.

(3) *The Number of Days which Later Menstruation lasts.*

Hart and Barbour consider it abnormal if the flow last less than 2 days, or more than 8. In 848 cases, I obtained an average of 5 days, closely agreeing with Playfair (who gives 4 or 5 days for the Home Country, while some French writers give 8 days for that country), and being an excess of rather more than half a day over the duration of its continuance in early life.

(4) *Amount of Pain in Later Menstruation.*

In 853 cases :—

No pain in	212, or	25 p.c.	as compared with	42 p.c.	in early	menstruation.
Some „	270, „	32 „	„	31 „	„	„
Great „	316, „	37 „	„	25 „	„	„
Very great	55, „	6 „	„	2 „	„	„

Thus late menstruation is found to be associated with pain of a varying degree in 17 per cent. more than in its earlier manifestations.

(5) *Amount of Flow in Later Menstruation.*

The average amount of blood lost is very variously estimated. Hippocrates thought 18 ounces, which is much too high; and probably Playfair, with 2 or 3 ounces, is more near correct.

In 815 cases:—

Flow was	Very scanty	in 40,	or 5 p.c.	as compared	with 3 p.c.	in early.
„ „	Scanty	„ 194,	„ 24 „	„	„ 21 „	„
„ „	Usual	„ 227,	„ 28 „	„	„ 41 „	„
„ „	Free	„ 272,	„ 33 „	„	„ 31 „	„
„ „	Very free	„ 82,	„ 10 „	„	„ 4 „	„

Comparatively,

The flow is of usual amount in	28	per cent.	Late, and	41	per cent. Early.
Is below the average in	29	„	„ „	24	„ „
Is above the average in	45	„	„ „	35	„ „

Instituting a general comparison, it will be seen that in early menstruation the flow is more regular, lasts a shorter time, is accompanied by less pain, is of a normal or usual amount much more often (13 per cent.), is below the normal less often (5 per cent.), and above the normal less often (8 per cent.) than in later menstruation, where the converse holds good. The very great majority of these women in whom later menstruation is taken, being married, and having had children, it seems that marriage and parturition tend to cause irregularity, a longer duration, more pain, and more variation from the usual flow than single life.

(10) *Age at which Menstruation Ceases.*

This is generally given as from 40 to 50, and Raciborski states that the largest number of cases of cessation are met with in the forty-sixth year. I have taken out 95 cases, and their average is 46 years; 4 of these women were single and had no children, and in them it ceased at $46\frac{1}{2}$ years. Of the 91 married women, 12 had no children nor abortions, and in them it ceased on an average at $42\frac{1}{2}$ years. The average age at which menstruation began in all cases was $15\frac{1}{3}$ years, so that the duration of menstrual life was $30\frac{2}{3}$ years; in the single women it was 32 years, and in the 12 nulliparous married women it was 27·4 years—3 years less than in parous married women, or longest in the single, and shortest in the married woman with no children. The greatest age at which it ceased was 60, and in this case it began at $13\frac{1}{2}$, so that her menstrual life extended over $46\frac{1}{2}$ years; she was married at 30, and had 2 children. The earliest age at which cessation took place was 28; in her it began at 15, married at 23, has never been pregnant, her present age being 43.

It is generally said that women, who commence to menstruate when very young, cease to do so at a comparatively early age; so that the average duration of the function is about the same in all women, those who commence late ceasing later than usual. I have tested this as follows:—In 37 cases, in which it began at 16 or over, the average age at which it ceased was $45\frac{1}{2}$ years, and the duration of menstrual life was 28 years. In 16 cases, in which the function began at 13 or under, the age at which it ceased was $46\frac{1}{2}$ years, and the average duration of their

menstrual activity was $34\frac{1}{2}$ years. These results show that if menstruation commences much later than usual, the average duration of its activity is $2\frac{2}{3}$ years less, and the age at which it ceases is 6 months less; while if it commences much earlier than customary, its average duration is $3\frac{1}{6}$ years more than usual, and the age at which it ceases is 6 months more than the average of all cases; so that I agree with Playfair and others, that the earlier the menstruation commences, the longer it lasts—early menstruation indicating an excess of vital energy, which continues during the whole childbearing life.

I have taken out in addition two points of general interest, though not actually included properly under the title of this paper:—

(*a*) The average age at which marriage took place was 20·79 years. The youngest was married at 10, menses began at 15, had 1 child, is 28 years old now, and regular. The oldest was married at 46, she began to menstruate at 15, has had no children nor miscarriages, is 49 now, and regular. Another married at 12, menses began at 14, had 17 children, and at 47 is regular.

(*b*) Average number of children which parous married women bore, is 4·48 (not counting abortions). A few remarkable cases of excessive childbearing are given:—

One had 17	Menses began at 12	Married at 18	Menses ceased at 49
,, ,, 17	,, ,, 12	,, ,, 15	,, ,, 60
,, ,, 16	,, ,, $14\frac{1}{2}$	,, ,, 15	At 40 is irregular
,, ,, 15	,, ,, 16	,, ,, 18	,, ,,
,, ,, 15	,, ,, 13	,, ,, 17	At 46 is regular
,, ,, 15	,, ,, 13	,, ,, 15	,, 40 ,,
,, ,, 15	,, ,, 17	,, ,, 22	,, 47 ,,
,, ,, 15	,, ,, 16	,, ,, 21	,, 47 ,,

It will be noted, that the average age at which menses first appeared in these prolific women was $14\frac{1}{4}$, just about the regular time, while they all married very early, averaging $17\frac{1}{2}$ years; the latter fact, in connection with the large number of children they bore, is perhaps worthy of consideration.

PILOCARPINE IN PUERPERAL ECLAMPSIA.

By R. H. J. Fetherston, L.R.C.S.I., L. et L.M.K.Q.C.P.I., M.D. et C.M. Edin.

During my residence at the Women's Hospital, it has been my lot to witness some twenty cases of eclampsia; and having tried several methods of treatment with varying success, I have determined to give a few particulars of the treatment from which the greatest amount of success has been derived, namely, by the hypodermic injection of pilocarpine nitrate. Before going into the treatment, I shall briefly give an account of the cases, so that you may be better able to judge of the value of the results. There have been in all twenty-two cases attended in the

hospital during my residence. Of these, twelve developed the convulsions in the hospital, the other ten being brought or sent there at various periods of the disease—three being moribund on admission, and dying in a few hours. Unfortunately, the notes of two cases have been mislaid, so that I am only able to give the particulars of twenty. Of these, nine were married and eleven single women, their average age being slightly over 24 years; the youngest was 17, and the oldest 44. Fifteen of them were primiparæ, and one woman had previously had eight normal confinements.

As to their condition when admitted—Thirteen were of uræmic type, with well-marked œdema of face and legs; two were apparently healthy, the other five being simply noted as delicate. The urine, on testing with heat and nitric acid, was found in every case to contain large quantities of albumen. Labour as a rule was slow, but in three it was rapid and precipitate; and in two it was doubtful if labour began at all. Delivery was completed unaided in thirteen, forceps being used in three, while podalic version was performed in one, and the remaining three died before delivery. Eleven of the children were born alive, only one showing any signs of convulsions during the time they remained in the hospital.

Coming to the eclampsic seizures—The fits began before labour in five, in five others during the first stage, four during the second, and two in the third, the remainder (four) developing the convulsions after the completion of labour. The attack terminated in four before delivery (three of these being at death), six upon the completion of labour, and the remaining ten at intervals varying from an hour to 4½ days after confinement. The average number of fits was thirteen, but this is by no means an accurate average, as in those who had convulsions on admission it was impossible to obtain the exact number of fits from which they had suffered. As to the mental condition—they, with four exceptions, became unconscious after a few fits, and remained so for several hours, in one case for 4½ days. The average maximum temperature was 102·5° F., the pulse varying from 120 to 160 per minute, while the respirations ran as high as 44. The termination as to the mother was death in five out of twenty-two cases—three, as I have before mentioned, being moribund on admission.

Treatment.—When possible, chloroform was given at the approach of each convulsion, and its administration continued for sufficient time to cause relaxation of the muscles. I may here mention that I found a very small quantity of the drug, if given in time, was sufficient to prevent the violent spasms. The bowels were well emptied, croton oil being generally chosen from its rapid action, and the simplicity of its administration. In seven, venesection was performed, the amount of blood taken varying from twelve to twenty-four ounces; and in three cases its beneficial effects was very marked, but in the others it seemed to exert little or no power in controlling the disease. Three patients had morphia by the skin, in doses of a quarter or a half grain; and in one a wet pack was used, without any appreciable result. After free purgation, enemas containing chloral hydrat. and potas. bromid., thirty grains āā, were given in eleven cases, being usually repeated every six hours; and if pilocarpine was used in the same case, the two drugs were made to alternate. Before going on to the treatment with pilocarpine,

I may mention that I at first gave it in all cases, but in two of them (feeble delicate women) rather alarming symptoms supervened, such as marked lividity with very feeble action of the heart, coma being profound, with considerable œdema of the lungs; so that I have now discontinued its use in feeble subjects, only administering it where the patient is strong, and often of uræmic type (with short thick neck, puffy face and eyelids, and more or less anasarca of the lower extremities), has a full, rapid and incompressible pulse, the urine being at the same time usually dark and scanty, containing much albumen.

It was in such subjects, more especially if met with early in the attack, that I have found benefit accrue from the administration of pilocarpine, which, if given under the skin and in full doses, usually acts in from three to four minutes, causing profuse diaphoresis, the perspiration pouring off the body, and drenching the patient's clothes. The pulse almost invariably slows down, and salivation is often very marked, flowing, if the patient is lying upon her back, down her throat, thus causing a loud gurgling noise at each respiratory effort.

The force of the fits is considerably diminished, and at the same time they often become less frequent for two or three hours, when the effects gradually wear off, and in from four to six hours the perspiration will have completely stopped, the skin again becoming dry, and the injections will have to be repeated as long as the fits continue, or until any symptoms contra-indicating their use should appear, such as the pulse becoming very feeble, permanent lividity of the face and extremities, or any degree of œdema of the lungs, which complication is not uncommon after prolonged and violent attacks, even when pilocarpine has not been used. But since I have only used this drug in such subjects as previously described, I have never seen it produce any symptoms to cause the least anxiety, though I have repeatedly given as much as three or four grains to one patient.

Dose and Administration.—The dose that I have generally used has been one-half grain of the nitrate given hypodermically, repeated, if necessary, every six hours for three or four doses; and then if required longer, I diminished the dose, finding that one-quarter to one-sixth of a grain was sufficient; this I continued till the convulsions ceased, and until the return of consciousness; and in several cases, I have kept up its administration after the return of consciousness in doses of one-tenth of a grain thrice daily for several days, thus keeping the skin moist, and so promoting the excretion of deleterious matter, and at the same time relieving the kidneys, which are usually in a state of disease. Care should be taken that the air of the room is warm, and that the patient is well and warmly covered during the sweating stage, for fear of lung trouble supervening.

In conclusion, I wish it to be understood that, while advocating the use of pilocarpine in certain cases, I do not consider that in it we possess a specific or a drug to supersede all others in the treatment of eclampsia, but wish to urge that in it we have, when used in suitable cases, a valuable adjunct to other more widely known and less dangerous drugs, such as chloral hydrate, potas. bromide, morphia, or chloroform.

THE OBLIGATIONS OF GYNÆCOLOGY TO OBSTETRICS.

By Felix Meyer, M.B., B.S.

If the title of this short essay should seem in any way equivocal, I would premise by saying that far from being in the slightest degree a depreciation of a specialty that is daily receiving greater recognition as a legitimate application of a special surgery and therapeusis for the diseases peculiar to women, it is rather a special plea for a more scientific development of a phenomenon which, originally universal in its naturalness, is nowadays too often unnatural, misunderstood, and in consequence, more or less—if I may use the term—mal-administrated; or to come at once to the indictment, I would say, that unscientific obstetrics are a very large factor in the product of modern gynæcology.

This opinion is based mainly on the experience gained by a residence of over four years as House Surgeon to the Women's Hospital, Melbourne, with an annual average accouchment of 600 women, an infirmary treating yearly some 350 gynæcological cases, and an average annual attendance of some 400 out-patients. Private practice has fully confirmed my views. My conclusions are:—

(1) That single women enjoy a disproportionately larger immunity from special disease than married women.

(2) That a large proportion of married women date their special trouble from confinement or miscarriage.

(3) That in a large number of this latter class, it is the first confinement or miscarriage that is the starting point of the trouble.

In making this estimate, I am not ignoring the fact that numbers of single women (and married women also), suffering from special disease, fail, from motives of delicacy, to present themselves for treatment; that in others, independently of childbirth, there may be hereditary, congenital, or acquired disease; and that incompatibility in marriage and general pathological conditions play a very important part; but even after eliminating these causes, I maintain that there still remains an unduly large number of cases which have their first source in the obstetric function; and it is the perversion of this function which I wish briefly to touch upon.

The Period of Pregnancy.

While it cannot be denied that any abnormal condition during pregnancy must discount the chances of a successful parturition, it is also true that such abnormal conditions are very often overlooked by, or unknown to, the medical man; since, except in the case of some remarkably disturbing element for which he may be summoned, he very often sees nothing of his patient between the time of his engagement and the onset of labour.

Many of these abnormal conditions, especially in the case of first pregnancies, are accepted by their subjects as natural accompaniments, and are allowed to continue with all their deteriorating effects up to the time of labour. Such, for example, are versions or flexions of the uterus, mal-positions of the child, leucorrhœa, blood discharges, and pathological conditions of the genital tract generally. Where, in

answer to questions, there is the slightest suspicion of the existence of anything abnormal, an examination should be insisted on, a little tact and delicacy on the part of the medical man generally overcoming the natural objection of a woman for the first time pregnant. I can only say that, by insisting on this method when deemed necessary, it has fallen to my lot to detect and treat beforehand complications that might have otherwise proved serious.

The question of surgical interference during pregnancy is one that can be answered only by the individual exigency of the case. While it is true that women have miscarried after the drawing of a tooth, it is also true that grave operations, such as ovariotomy, have been performed without in any way disturbing pregnancy. I have done numerous small operations on pregnant women, with and without an anæsthetic, even to removing a cervical polypus, without any untoward result.

Coming now to labour itself, we arrive at a period during which unskilled obstetrics provide ample material for the gynæcologist. If labour with the human species were the almost purely physiological process it is with the lower animals, midwifery, as an art, would have no need of existence; and what is often sneeringly termed "old women's work" might be safely relegated to old women.

The conditions of life, however, bring about so many deviations from the natural process, as to render it very often pathological; and in this part of medical science more than in any other, I take it, does it lie within the function of the practitioner to bridge with the smallest span the distance between the natural and the unnatural.

How this function is perverted, I wish briefly to indicate. The value of a rational antisepsis needs no comment from me. The enormous reduction of the mortality of lying-in hospitals over the whole world, since its introduction, speaks volumes. Grave, then, is the error of those accoucheurs and nurses—and their number is not few—who ignore it. I use the word "rational," because its employment is very often irrational and excessive.

The First Stage of Labour.

And here we come to the *questio vexata* of the clinical significance of lacerations of the cervix. And while I would not, as some do, ascribe all pathological conditions of uterus to this lesion, I venture to think that few will agree with even such an eminent authority as Noeggerath, who, basing his opinion on an examination of one hundred cases, declares that lacerations have no influence on the development of uterine affections, either in regard to number or intensity. If wrong, I am content to err in the good company of almost the whole of the American gynæcologists, a large number of Continental ones, and latterly, not a few of the English specialists.

And though statistics show that lacerations exist in some 30 per cent. of parous women, it does not follow that they do so rightly. It is sufficient for my purpose to state my belief, that lacerations of the cervix have an importance that extends beyond the time of their production; that, in addition to the risks of hæmorrhage and septicæmia at the time, they lead to exaggerated cell-growth (one form of which may be epithelioma), sub-involution, and chronic cervical endometritis. On these grounds alone, I advocate a greater care in the guarding of

the cervix in the first stage than I believe at present obtains among accoucheurs. Its claims are surely equally as strong as those of its analogue--the well-cared-for perinæum. I do not for a moment forget that lacerations will and do occur, no matter what care is given, but I defend the position that they are largely preventible. Among the preventible causes is—Labour going on with a rigid os. In anæsthetics, in addition to other valuable results, we have the almost certain remedy of this complication.

In connection with this part of the subject, I may mention a somewhat interesting case, so far as I know, unique:—

I was called one morning at ten o'clock to see a lady in labour. She was the mother of five children, but had had no child for seven years, and some twelve months back had been the subject of Emmet's operation. Pains were slight. She would permit of no examination. I cannot say I was very anxious as to the condition of the os, never having previously attended a woman who had had the operation.

I received an urgent message in the night, and coming into the room at the commencement of a strong pain, I examined and found the os small (the size of a threepenny piece), with a hard band of membrane occluding; and as the pain proceeded, I felt the head of the child gradually tearing through the left lower part of the cervix—the hair of the child's head could be distinctly felt. There was no time to lose; I poured a quantity of chloroform on to an inhaler and made the nurse apply it to the patient, and guiding a curved blunt-pointed bistoury along the right forefinger to the cervix, I slit through the cervix up to the margin of the laceration just produced by the head. Even then, as the pain continued, there was great difficulty in preventing the head from pushing upwards and enlarging the tear towards the fundus. The head had to be guided by two or three fingers over the cervix, as one would support a perinæum, but delivery was effected without anything worse than severe hæmorrhage. The patient made a good recovery, and twelve days after, on examining, I found the laceration healed.

I have since then had occasion to attend several women who have had this operation on the cervix (Emmet's), and with one exception--where I divided a cicatricial band in the beginning of labour--I have had no trouble.

While it is in no way the province of this paper to deal with the treatment of lesions at a time remote from the period of parturition, during which they may have been produced, I must—unless I have thoroughly misunderstood one part of Dr. Batchelor's able and practical address of yesterday—beg to differ from his views as to the wisdom of ignoring the significance of extensive lacerations of the cervix, for I have yet to learn that such solutions of continuity are physiological; and as for the few cases on which I have operated during only four years of private practice, I feel certain they would have been justified in the eyes of Dr. Batchelor, or any exponent of gynæcological or general surgery, as much from their abnormal appearance as from the relief of symptoms which followed operation.

If in slavish subservience to a fad, some specialists attack every form of cervical eversion and small fissure with operation, it is the wrongful exponent of a system, not the system itself, which must be condemned.

However, when all is said and done, I think most will agree that we should try to prevent the tearing of the os in labour; and so far as rigid os is concerned, in my experience the value of anæsthetics (not necessarily deeply pushed), is beyond a doubt.

Another cause of laceration of the cervix is the hasty and ill-advised use of forceps, either while the os is rigid—a not uncommon practice—or before it has had time to dilate—a still more common practice. In such cases, the instrument might well be termed præceps. It may seem puerile to allude to such a self-condemning practice, but I make bold to say it is such a common one, as needs allusion to in a paper like this, which is in the main suggestive.

If the use of forceps is abused in the first stage, it is much more so in the second. The how and the when of their application cannot be taught theoretically; but this is certain, that to their misuse and unskilful application are due, very often, lacerations of perinæum, rectocele, cystocele, vesico-vaginal and recto-vaginal fistula, pelvic cellulitis and peritonitis—the latter very commonly the first link in a chain of pathological process, leading up to ovarian and tubal disease. Formidable as this list appears, it is a true bill; and in taking the history of every woman who attended either as an in-patient or out-patient during my term of residence at the Women's Hospital, how often has the stereotyped reply come, "I have never been well since my first confinement; I was hurt with instruments." I yield to none in my appreciation of the value of forceps, but in the hands of many, they are a thing of evil.

Before leaving the subject, I may mention that:—(1) Before using forceps, I never omit to draw off the urine, or make the patient pass it. (2) I invariably use an anæsthetic more or less deeply. (3) In most cases, I remove the blades before the head has passed the perinæum, in order to allow some gradual distension of the latter, and also to give the uterus some share in the expulsion of the child.

Of the care of the perinæum, as a necessity, I need not speak; but I may mention that I now condemn what I at one time approved of, viz., the practice of pushing the head through the vagina by means of a finger or two in the rectum. Injury to the bowel or fistula may follow from this practice. It is far better to apply pressure at the space between the anus and the tip of the coccyx. I consider that all perineal tears, unless there is some special contra-indication, should be at once brought together with sutures; good union is seldom effected without; no obstetrician, I would venture to say, should be reproachable with the necessity of perinæorraphy.

The mismanagement of the third stage of labour is responsible for not a little mischief to the uterus and appendages. On the best method, there still exists a great diversity of opinion; but practically there are two schools—the advocates of Crede's method, and those who follow the expectant line of treatment.

Dr. Felsenreich states, that out of 13,904 cases which occurred during four and a half years in Professor C. Braun's Clinic, Crede's method succeeded perfectly well in all but fifty-one cases. In Munich Hospital, on the other hand, Winckel allows two hours to elapse before resorting to Crede's method. The two schools, however, are gradually approaching each other, the advocates of Crede's method inclining to

lengthen the time before using expression, and the supporters of the expectant method shortening their period of expectancy. Personally, I have obtained the best results from Crede's method, and should be very sorry to allow a placenta to remain in the vagina an hour, when the mildest of traction on the cord, or even the passage of a finger into the vagina, would suffice for immediate delivery. Hasty and excessive manual pressure on the non-contracting or soft uterus is often followed by displacement, sub-involution, or an inflammatory condition of the organ and parts adjacent.

One important point in connection with the subject is that ergot should not be given during the placental stage.

The amount of rest required by women in the puerperal condition is, to my mind, greater than that usually insisted on by obstetricians. The average time required for involution is ten weeks, and when we regard the number of women who from choice, not necessity, are about and active in two to three weeks, resuming the pleasures and labours of life, we cannot be surprised at the consequent uterine troubles. It is abundantly proven, that involution is accomplished more slowly where hæmorrhage has been an accompaniment of parturition, and also in the case of those who do not nurse—an argument which might well be made use of by medical men, in counteraction of the growing tendency, especially among the upper classes of women, to avoid the duties of nursing.

Such is a crude and imperfect sketch of the prophylactic duties of obstetrics against secondary disease, and while it may contain nothing new or original, or nothing that may not be found scattered through the pages of a standard text work on midwifery, it may, as a purely clinical experience, serve as a reminder. There are medical men who get through a large midwifery practice year after year, in happy ignorance of the fact that many of their former patients are applying to special hospitals, or specialists, for the relief of conditions directly traceable to parturition; and, no doubt, the rank growth of self-constituted, ignorant, and unlicensed so-called midwives is contributing its quota to the sum of gynæcology. If obstetrics are worth doing at all, they are worth doing well; and, regarding every woman in the light of a "complex organism round a uterus," the maintenance of the uterus in a natural condition during the storm of parturition is a *sine quâ non* in the preservation of the health of that organism.

Dr. Chambers observed that the nature of diseases of women had changed much in the last twenty years. Formerly, we heard a great deal of vesico-vaginal fistulas, and very little of lacerations of the cervix. Nowadays, matters were very different. He thoroughly agreed with Dr. Meyer, that a confinement was often the starting point of a woman's trouble. We were in need of more careful accoucheurs and nurses. He was of opinion that laceration of the cervix interfered with involution of the uterus.

Dr. Balls-Headley believed that, in certain cases, disease of the uterus and appendages was due to parturition. He made it a point in his practice to enquire if forceps and chloroform were used in the confinement. He looked upon lacerations (a subject, by-the-bye, somewhat out of the scope of the paper) of the cervix as a wise provision of

Nature for the prevention of too many children. He thought they were very often due to the head coming through a rigid os. He was one of those who believed in their importance as a cause of disease. They brought about a slowing of involution, retroflexion, and prolapse.

Dr. JAKINS agreed with Dr. Meyer, and would go beyond him, especially in the use of anæsthetics, which, more frequently employed, would prevent many grave accidents.

[At this point, Dr. BATCHELOR asked permission to interrupt Dr. Jakins, with the object of saving the time of the meeting, as he perceived some remarks he had made had been misunderstood; and although only too pleased to discuss real difficulties, he did not wish to waste time with shadows. As a matter of fact, the opinions he held seemed to be unanimously held by members, viz., that cases of laceration, requiring operation, were without doubt occasionally met with; but the condition was by no means so common as to class it among one of the common diseases of women causing severe and constant symptoms; and, for his own part, he considered the discoveries of Emmet immensely less important than the discoveries of Tait. With all due deference to his friend, Dr. Balls-Headley, whose experiences he most readily admitted were larger and wider than his own, he had formed an opinion diametrically opposed to him on this subject. He had never seen, heard of, or imagined it possible, that a case requiring trachelorraphy could occur in a single girl, except the laceration resulted from a previous pregnancy, or operative measure.]

Dr. JAKINS continued, that a great many cases of laceration could be cured without operation, and that there were many in which the laceration healed spontaneously. With regard to the third stage of labour, he removed the placenta almost immediately, by passing a couple of fingers into the uterus.

Dr. WORRALL differed from Dr. Meyer as to forceps being a cause of lacerations; he used forceps once in every six cases. The use of forceps for contracted pelvis was rare in New South Wales. If laceration were produced, it was preferable to vesico-vaginal fistula. He differed altogether from Dr. Jakins' method in the third stage. He thought that no man should insert his hand into the uterus after delivery, except in cases of adherent placenta. So far as the treatment of lacerations was concerned, he did not believe in a cure of the laceration. The operation was to take a wedge-shaped piece from the cervix, a process which lightened it, and otherwise improved it.

Dr. ADAM agreed with Dr. Meyer. As regarded lacerations, there were no doubt many cases of granular os which healed under the action of chemicals; but he would ask—Why not do a simple surgical operation, which removed unhealthy surfaces?

Dr. FOREMAN did not agree with Dr. Balls-Headley, that lacerations of the cervix put an end to pregnancy. He thought they rather favoured it. He met with a great many cases of laceration. If the surfaces were covered by healthy membrane, he left them alone; if there were ectropion, he operated. The best proof of the value of the operation was the result to the patient—comfort, and loss of symptoms; and moreover, there was no danger in the operation.

Dr. BATCHELOR congratulated the Secretary on his paper. He thought that slitting up the os by bistoury, as Dr. Meyer had done, was not done

often enough. If we did not take Nature's hint, plain enough in Dr. Meyer's case, rupture of uterus would follow. He believed that in a case of eclampsia which he saw, cutting of the cervix done early would have saved life. He quite agreed with Dr. Meyer as to the abuse of forceps. He objected to Dr. Jakins' introduction of the hand in the third stage of labour. Apart from other objections, such a proceeding (as Dr. Worrall noticed), favoured the introduction of bad air into the passages. He knew another practitioner who followed Dr. Jakins' method, and who had had no bad results, but he should be sorry to adopt it. He had done Emmet's operation, and did not agree with Dr. Foreman as to its non-dangerous nature.

Dr. Meyer, in reply, was pleased to find that practically all the members agreed with him. Dr. Balls-Headley was perhaps right in saying that the subject of lacerations was hardly within the scope of the paper, and he must admit that he had introduced the subject after hearing the President's address, in order to cause a discussion on the subject, as there were evidently differences of opinion. As regards forceps, he begged to inform Dr. Worrall that his average was almost as great as Dr. Worrall's (1 in 6); still he maintained that, to save time, &c., they were abused. Dr. Balls-Headley's idea, that lacerations of the cervix were a provision of Nature against too frequent pregnancies (combatted by Dr. Foreman), was opposed to the experience of Noeggerath, who thought that women with lacerated cervices conceived more readily than those with the cervix intact. He could not agree with the method of Dr. Jakins in the third stage of labour.

ELECTRICITY IN DISEASES OF WOMEN.

By J. Foreman, M.R.C.S.

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This subject is one that has exercised the medical mind to a great extent lately, owing to its re-introduction by Apostoli, who has recorded a marvellous success, certified to by several leading men in England.

One could not hear of a method which promised so much to the unfortunate patients and to the practitioner, on account of its harmlessness, without being desirous of trying it. Accordingly, I had 100 Leclanché cells fitted up in my rooms, and I got the instruments, such as are used by Apostoli, from Paris. At the same time, a large battery similar to mine was fitted up at the Prince Alfred Hospital, where every facility is always given by the directors for investigation.

The principal use for this treatment was for fibroids, and so much has been written about it in the medical journals that I need not take up your time with details. The instruments and the modes of application were as described by Apostoli, namely, a platinum sound introduced into the uterus and guarded by a vulcanite canula in the vagina, and on the abdomen a large soft clay pad, with a large zinc plate on it. The

galvanometer at the Prince Alfred Hospital was a very elaborate and ingenious one made by Professor Threlfall; mine was Apostoli's, which corresponded exactly with the former. The strength of the current varied from 50 to 300, the latter always under chloroform. The number of fibroids operated on by this method was ten.

Without going into particulars, which would not be instructive but only wearisome, I will sum up the results, which were disappointing in the extreme. In some of the cases where there was pain, ease was certainly given, but in no case was there a diminution in the size of the tumour, nor was there a decrease in the amount of hæmorrhage which could not be produced by other means. In one case where she had had forty applications, I gave a current of 350, and some sloughing and high temperature resulted. In another, with the same current, death ensued. The treatment lasted from six to twelve months, and the applications were generally twice a week when well.

My experience, you see, has not been a happy one, and I cannot understand a man like Dr. Keith writing as he does about it. It was mainly due to reading his articles that I persevered, for praise for the system comes with great weight from one who has been the most successful in removing these tumours. I could not see any fault in my way of applying it. The sound was always carefully passed, and generally without pain, the pad was large, and the current strong enough, and plenty of time given, both in the gradual increase of the current, and the time the patient was under it. At any rate, it has not come up to the expectations I had formed and hoped for.

I can now speak of cases where it has been of benefit. In cases of endometritis, where there is a thick viscid mucus so difficult to get away, applications two or three times a week will prove of great use; but even here it is far inferior to curetting, both in point of time and for certainty of cure. Cases of chronic metritis are relieved of pain to a great extent, but it is a curious thing that the improvement lasts only for about forty-eight hours. It otherwise exerts no influence on the tissue of the uterus.

The cases I have been perfectly satisfied with are those where there has been an enlarged ovary, bound down and very difficult to remove by abdominal section; in fact, I look on it as the most difficult operation there is. The first of these cases was on the left side; the swelling about the size of a hen's egg, very fixed, and containing a little fluid. It was very painful, and caused so much discomfort that removal was necessary. Under chloroform, it was pierced by this lance-pointed stilette for about half an inch, and a positive current of 150 milliampères given for ten minutes. No reaction after, and there was such a marked decrease on examination four days later, that it was repeated. She left the hospital perfectly well in a fortnight, with scarcely a trace of the enlargement.

The second was more instructive, as the growth was solid, and about the same size as the former. A large sized aspirator was used in all directions without a trace of fluid. Three applications were used in this case, with a result better than the former, if possible.

The third case was one where the appendages had been matted together from inflammation, and the pain was intense; two applications were made, with perfect relief, and subsidence of enlargement. I have

seen this patient twelve months after, and on examination there is nothing abnormal to be felt, and she says she is in perfect health. The second wrote to say she had no complaints after eight months, and the first would have presented herself again had there been any cause.

This, to put it shortly, has been my experience in electricity. The number of cases of metritis and endometritis has been considerable; the major troubles are given as they occurred. I have not wearied you with details, because, at a meeting like this, most of you are as well, if not better, acquainted with the subject than myself, and one should give his experience, and not wander off into comparative trifles, which every one should be acquainted with. I am sorry I cannot say with Keith, that the knife will never be required for fibroids. I occasionally do a hysterectomy, and have no cause to be ashamed of my success; but no one would hail with greater pleasure any means, such as I thought this would be, that would give us a safe and bloodless cure.

Dr. Rowan said that he was personally obliged to Dr. Foreman for his paper. In his own case, he had had good experience of the method. He had made himself acquainted with the details, and had read carefully Apostoli and Keith. Having a complete apparatus, he had applied this form of treatment to fifteen cases in his own private hospital, and like Dr. Foreman, he was sadly disappointed. He must, however, except the application to cases of menorrhagia, where he had great results, but on the cessation of the application, there was a recurrence of the old trouble. He never used more than 250 milliampères. He found alarming symptoms follow on exceeding this dose. He thought that the tenderness and pain over the ovary, extending to the groin, which sometimes ensued, was due to the over-stimulation of the nerves. He had applied the method in acute pelvic cellulitis, without good results. In answer to a question of Dr. Balls-Headley, he (Dr. Rowan) said that he had passed the sound into the cavity of the uterus in uterine thickenings, and afterwards used the stilette and punctured the wall all round.

Dr. Worrall observed that what struck him in this new method was its great seriousness. The necessity for chloroform rendered this form of treatment largely impracticable. He thought that metrorrhagia was more easily treated by curette.

Dr. Jakins could speak of this method from his private practice, and not favourably. Apostoli had reported no cures, merely improvements.

Dr. Balls-Headley remarked that, though it might be said "fibroids did not kill," yet they often broke down, and wore patients out, causing anasarca, &c. Dr. Foreman's method of applying electricity was new to him. He had seen Apostoli at work, and was not at all impressed. According to him, two or three applications not exceeding two hundred and fifty milliampères sufficed. Moreover, Apostoli's diagnoses were not so definite as one would expect. He had seen women in London hospitals carefully treated for fibroids after this method, and their temperatures had gone up to 102°. In brief, he had not had much reason to be pleased with this form of treatment.

Dr. Batchelor thanked Dr. Foreman for his paper on a wide and important subject, and his special case was an example to us to bring forward bad as well as good results. He was not surprised, however,

at Dr. Foreman's results. His own experience was too small for a decided opinion on his part, but he must say that Dr. Foreman had missed the essential element in Apostoli's treatment, viz., *accurate dosage.* He would point out that "seventy or eighty cells" meant nothing definite, for if one cell happened to be defective, all below were impaired, and the result might be a weaker current than with only twenty cells. Dr. Foreman had used large batteries; Keith used a twenty-five Leclanché. Gaiffe, of Paris, used circular carbons, with a small internal resistance, of twenty-four cells. Treatment was quite possible with an ordinary thirty-cell Stöhrer battery, with a strong bichromate solution. Then there was a difference of galvanometers. He (Dr. Batchelor) had all his apparatus made in Dunedin, using a bichromate solution, an ordinary galvanoscope, graduated by a tangent galvanometer, giving accurate readings. With a Stöhrer's battery in good order, and with a fresh solution, he had obtained 200 to 240 milliampères, with an extreme resistance of 170 ohms, which from numerous observations he believed to be the average resistance between the uterus and the abdominal walls. He was convinced that the local effects of the current were those of a strong chemical cautery, with decomposition at the site of the poles. On one occasion, through deficiency of the external rheophore, he caused a severe burn—resulting in a slough which took a month to heal; this, too, in a current of only eighty milliampères. Where there is less resistance and a far more concentrated current, we have only to expect much greater effects. On the whole, he believed this method to be a convenient form of cautery. He had, under three months of this treatment, reduced to below the umbilicus a tumour originally extending to the ribs—half an inch above the lowest rib on the right side, and one and a half inches above the corresponding left rib. Although Apostoli might be an enthusiast, and, like himself (the President) in regard to his views on "tubes," extreme, yet we could not possibly ignore statements coming from men like Keith, who had given up hysterectomy. He would point out to Dr. Rowan that he had applied the constant current to an acute inflammatory condition. This was quite opposed to Apostoli, who had recommended the Faradaic form until the subsidence of the inflammation. It was quite possible, in such cases, that length of time sufficed for a cure.

Dr. Foreman, in reply, said that the only good he saw in the method was in its local action. In old inflammatory exudations, his experience differed from that of Dr. Batchelor; nevertheless, he would try the method. Dr. Worrall's objection, on the score of chloroform being a necessity, he thought could not have much weight. With regard to the remarks of Dr. Balls-Headley, he agreed that cases of fibroids did end fatally. He had seen a large number of such cases. He remembered however one case of a lady, the subject of a large fibroid, living in unhappy circumstances, and wishing for death. She was greatly lowered by hæmorrhages, till her skin became like parchment. Death was daily expected. He kept her in bed for months, and she was now absolutely well. With regard to dosage, he could tell Dr. Batchelor that he measured his doses with the galvanometer to the extent it permitted.

SECTION FOR DISEASES OF THE EYE, EAR & THROAT.

PRESIDENT'S ADDRESS.

By Mark Johnston Symons, M.D., Ch. M. Edin.

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Hon. Ophthalmic Surgeon to the Adelaide Hospital.

Gentlemen,—

My occupancy of the position of President of the Section for Diseases of the Eye, Ear and Throat, I feel to be a very high, but unearned honour; and my feeling of gratitude to the organisers of this great Congress is all the deeper, from the knowledge that I am so little entitled to it. I cannot be insensible of the fact, which I freely admit, that rather than to myself, it is to the colony from which I hail, that I owe my selection to this position—the colony in which I am proud to be able to say the idea of an Intercolonial Medical Congress had its inception, the able carrying out of which gave to us the first of what I hope, and indeed may prophesy, will prove to be a long and successful series of these invaluable meetings.

At the first meeting of the Intercolonial Medical Congress, the Sections were four in number—Surgery, Medicine, Gynæcology, and State Medicine; there was no division set apart for the subjects included in this Section. Doubtless we have, in most great undertakings, to creep before we run; but the leap to the dignity of a Section, which has been made here by special subjects, is a matter for congratulation to all of us generally, and especially to those of us who devote our time and thoughts to any or all of the subjects embraced in this Section.

The separation of the organs concerned in the three senses of seeing, hearing, and speaking, from general Surgery into a Section of this Congress, leads us to consider this severance, and the existence of specialism in our midst. It is well known that there are many of our profession who regard the existence of specialism with grave doubts as to its justification; and that its rapid growth in recent years has the more or less silent disapproval of many of our brethren, who are leaders of thought amongst us, whose breadth of idea generally is beyond question, but who still look with alarm at the spread of specialism which is becoming visible in all directions, lest its votaries become narrowed in their knowledge of or interest in disease by the limitation of their work.

A glance at the history of Surgery shows us that every medical practitioner was a specialist in early times. Herodotus tells us that the healing art in Egypt was subdivided into many specialties in his day—"Here, each physician applies himself to one disease only, and not more; all places abound in physicians—some for the eyes, others for the head, others for the teeth, &c." Celsus showed predilections for the eye and ear. We find him writing on tumours of the eyelids, pterygium, symblepharon, staphyloma, and on cataract (where he describes the operation of inferior keratotomy), and also "the modes of repairing defects of the ear." Antyllus, in the first century, affected throat work, and is supposed to be the first who recommended bronchiotomy in inflammations attended with tumefaction, which threatened suffocation. In the eleventh century, Albucasis, in advocating the operation of depression for cataract, mentions that he had heard of a certain oculist who sucked out the cataract through a small tube.

In a lesser degree, specialism prevailed throughout the middle ages; but apparently they did not as a rule become specialists in the ordinary course, but rather acquired what knowledge of general principles they possessed as a result of studying the particular branch in which they professed to be proficient. This kind of specialist exists now in the form of what are colloquially termed "quacks," and we have a variety of them in the Australian colonies. They affect chiefly a special knowledge of the subjects comprised in this section; and from the results of their practices, we may gather the unfortunate condition of the patients of many of those specialists who practised in bygone ages, assisted chiefly by rule of thumb and magic nostrums. This specialism of the ancients can hardly be compared with the specialism of to-day.

In the Legal profession, specialism abounds—some devote themselves entirely to the Law of Probate, others to Divorce, to the Admiralty, or to the Ecclesiastical Courts. In Engineering, specialism is most marked in the divisions of civil and mechanical, with the subdivisions of sanitary, mining, hydraulic, electrical, &c., &c. But specialism in Medicine is as little comparable to specialism in Law or Engineering, as is the human organism to an Act of Parliament, as the study of the living to the study of the inert.

The term "specialism" is faulty, as conveying the idea of work done in an unusual manner; while the definition of our work should be the exercise of an expert knowledge of the diseases of a naturally defined organ of the body.

Specialism immediately takes its rise from the common fact, that attention can be better directed upon a special object than upon a group of objects, particularly when such special object has an inherent interest for the observer; whereas things in which we take only a general

interest are "seen, rather than distinguished." In Medicine, specialism has an interest which can be felt in no other profession. The wondrous structure of the organs concerned in the special senses, the beauty of their architectural design, the marvellous perfection of their adaptation to the purposes of life, the inaccessibility of their mechanism to ordinary observation, all tend to create a taste for the study of one or more of these organs in health, a longing for an acquaintance with their diseases, and a desire to master the details of their rational treatment. Moreover, there is an absorbing satisfaction in watching their return to health and usefulness. The fascination felt in his work by a specialist increases with his opportunities of observation, the origin and nurture of which may be ofttimes traced to a personal defect, claiming his greater sympathy. He becomes accustomed to the technique of examination, to a high appreciation of the value of the organ with which he has special concern, and to a desire to benefit his fellow sufferers, which is dissociated from mundane calculations. It is with a feeling of pride that he finds himself, after years of general work, accepted as a specialist; able to devote all his time and all his thoughts to that one part of the enormous field in which he labours, but with the knowledge that his own field of study is still very large. It is then that he may be excused the neglect of other parts, to leave unhampered the pursuance of an intimacy with a part of Surgery, where special methods of observation, or special manipulative or operative dexterity, is required.

Specialism in medicine is the natural outcome of progress in medical science; and, as in every other branch of science, there is a continuous progression from the general to the special; were it not so, retrogression would be implied, which is practically impossible. The progression is in fact the operation of a natural law, and all we can consider is not whether specialism in medicine is desirable, but whether it is advisable to assist the progression as far as lies in our power by artificial means. Are we to assist the acquiring of special knowledge, by sacrificing to some extent the study of general principles; or are we to continue to recognise in our colleges and universities a general knowledge only, and allow specialism to mark out its own course? In attempting to find an answer to this question, I think it may be taken for granted that, under any circumstances, the few years of study at present prescribed for intending followers of our profession are none too long in which to obtain such general instruction as it is absolutely necessary a specialist in any branch should have. If we wish to assist specialism, we must confine ourselves to individual exertion—firstly, in following the natural bent of our inclination (if we have one) in taking up the special study of any particular branch of medicine; and secondly, in practically recognising the status of brother specialists in their

particular line. This latter is already done to a large extent; and so far as I can gather, its only effects have been the benefit of the public and the advantage of the profession, the status of the members of which must naturally be improved thereby. Specialism is welcomed by the general practitioner, who can at any time obtain the aid of one presumably more familiar with certain diseases, probably of rare occurrence, without the suspicion that such action may cause the loss—as patients and as private friends—of the sufferer, his family, and probably some of his acquaintances.

I do not know that an opposition to specialism exists among the profession in this continent; but I certainly think that he who is true and just to himself, and honourable in his dealings with others, and who can prove an expert knowledge of certain branches of his profession, need never apprehend being proscribed by his fellows, but may expect the support and co-operation of the busy practitioner, who cannot spare the time for the purpose of making himself as familiar with those details of departments of our work which create the specialist, or the time for the working out of the details which the proper examination of special cases requires.

The importance of diseases of special organs has been direly neglected in our teaching centres—a fact which entails an after-application, the realisation of which is a question of opportunity, rather than of desire. The growth of specialism in the future will be regulated only by a better attention to the teaching of these important subjects in the curriculum. This limitation of practice is a recent departure, born of the extent and complexity of medical knowledge in its entirety, of the whole of which no one can claim to have an equal grasp; and the enormous bibliography of the present time will sanction, if not compel, a limitation of correct study. Thus we find the reason for the existence of specialists, in that no one can expect to be *au courant* with all branches of medicine and surgery. The argument resolves itself into one of the external influences surrounding one's medical life, rather than an aim on the part of the specialist to separate himself from the work of his brethren.

We have only to look at the pressure of work carried on by the many special hospitals, at the good these hospitals have done and are doing, and at the success of the special societies, to recognise that specialism has done much to relieve former apathy, to realise the fact that the specialist has the confidence of the public, and to demonstrate that he is accepted by his fellows. To weigh the lasting benefit done by specialists to our craft, we have only to recall the names of such lights in the science of Ophthalmology as Mackenzie, Bowman, Graefe, and Donders; in the science of Otology, as Cleland, Toynbee, Wylde, and Politzer; in the science of Laryngology, as Tobold, Voltolini, Czermak and Turck;

the bare mentioning of whose names, without alluding to their many illustrious colleagues, would answer the decrying note levelled against true specialism from whatever source.

Can the present, or will the coming generation of practitioners ever repay the specialist for the boon of the post-graduate classes, created by specialists and maintained by themselves. They are the outcome of the specialist's self-sacrificing love of his profession. That specialism is beneficial to the general good, I do not doubt; that it may be carried over far, I do not gainsay. The great drawback to specialism lies in the limitation of the field, which renders possible the existence of those pretending adventurers, who find adverse criticism less fraught with the risk of exposure, in proportion to the smallness of compass of the subject with which they pretend to deal, and so the more easily deceive an over-readily gullible public; but these pretenders would soon cease to exist, as parasites in a noble profession, and as a fraud on an unguarded public, were the words written by Rhazes in the ninth century applied by the sufferer of the nineteenth century in the selection of a medical attendant —"Study carefully the antecedents of the man to whose care you propose confiding all you have most dear in the world; that is to say, your health, your life, and the health and lives of your wife and your children."

ON CONVERGENCE.

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The study of convergence is at once interesting, intricate, and incomplete. A knowledge of it is essential to those of us whose aim it is to enable our fellow creatures to obtain, or retain, for their highest sense its greatest benefit, namely, perfect vision with absolute comfort. Good sight with comfort, in the possessor of two healthy eyes, depends upon the absence of any defect of static and dynamic refraction; and it is our duty to correct dynamic as carefully as static refractive defects, if we would do justice to our patients and to ourselves. The subject is still in its infancy, and in the belief that every contribution thereto may be useful, I bring before you, for your consideration, a few notes bearing practically upon that matter.

Convergence may be simply defined to be the inclination of the visual lines meeting at the point of fixation; or in other words, the vertical angle of a triangle, of which the eyes form the extremities of the base, and the point of fixation the vertex; which point will lie within infinity, or not more than twenty feet from the observer. For, supposing the point to be beyond this limit, the inclination of the visual lines is so

minute as practicably to be unappreciable, and therefore we say that, for points outside this limit, the visual lines are parallel. This inclination is given to the eyeballs by means of the internal recti muscles. The horopter is a curved line along which the two eyes can join in sight, the two eyes initiating a balance at infinity, and governed for points within infinity by the instinctive muscular consent in which the muscles of adduction are harmoniously associated with the muscles of accommodation of both eyes. The law which governs the extra-ocular muscles is, that the fovea centralis retinæ of each eye must be directed upon the object observed.

This law, in conjunction with obedience to the law of accommodation, results in an object at the point of fixation being seen as a single clearly defined object, and binocular vision is then said to exist.

It is recognised that an intimate relation exists between the contraction of the ciliary muscle and of the internal recti; between accommodation and convergence. This synergy necessitates the admission of a common centre of innervation. True binocular vision is absent in very young infants, being attained with the functional development of the brain, from which arises the capacity of receiving the image upon associated percipient points—the great essential of binocular vision.

In some subjects, this capacity is never attained; in others, it may be lost after having been presumably acquired. The absence of exact binocular vision is frequently unremarked by the subject, and varies from an unconscious lack to the inconsequential orbital rollings of cerebral under-development, as typified in young infants. It has been seen, that good vision depends upon accommodation and convergence being harmoniously exerted. Of these two, the accommodation depends upon the elasticity of the lens, and the proper action of the ciliary muscle, and, in the absence of disease or functional upsettings, varies little in different individuals of similar age, but gradually lessens from youth to old age; whilst convergence, on the other hand, varies in persons irrespective of age, depending as it does upon the sufficiency of the muscles. To the latter, consequently, we will devote our attention.

In regarding the behaviour of the internal recti muscles, we must take into account the resistance of the external recti, and both with their bearing upon binocular vision.

We are taught several methods by which muscular insufficiency can be gauged :—

First method.—Instruct the patient to fix a point, such as the tip of the finger, at thirty centimetres distant from the eyes; cover one eye, to conceal the object of fixation. If the eye from which the object of fixation is cut off maintains its direction, the muscles are normal in power; if it deviates outwards the internal muscles, and if inwards the external muscles are insufficient.

Second method.—Place a prism with its base upwards before one eye, say the left, and direct the patient to gaze at a card, upon which is drawn a vertical straight line having a dot at its centre, placed at reading distance. The prism causes vertical diplopia, and prevents binocular vision. Two dots will be seen; if seen on the same vertical line, the muscles are said to be competent. If two lines, having a dot upon each, be seen, insufficiency of the muscles is proclaimed. Should

the upper dot, which belongs to the eye having the prism in front of it, be seen to the right, *i.e.*, crossed vertical diplopia, there is said to be insufficiency of the internal recti. Should the upper dot be seen to the left of the lower dot, *i.e.*, homonymous vertical diplopia, there is said to be insufficiency of the external recti, and that the prism placed horizontally, which will bring the upper dot directly above the lower, is the measure of the insufficiency.

Third method.—Place a prism of 5° base upwards before one eye, say the left, and a red glass before the right eye. Direct the patient to fix a lighted candle at twenty feet. Two flames will be seen; the red flame of the right eye will be seen on a higher level than the uncoloured flame of the left eye. Should the red flame stand directly above the other, there is said to be equilibrium of the muscles. If the red is to the right—homonymous diplopia—we have insufficiency of abduction; and if to the left—crossed diplopia—we have insufficiency of adduction. The prism placed horizontally, which brings the images vertical, is the measure of the insufficiency.

Fourth method.—To measure the capacity of the muscles at twenty feet, place a series of weak prisms with the base inwards. The prism immediately below the one which causes diplopia marks the measure of the abductive power, the adductive power being similarly measured by stronger prisms placed, base outwards, before the eyes.

These methods are found in all standard works on the Eye.

Landolt, in his book on "Refraction and Accommodation of the Eye," teaches :—

Page 333.—"In order to fuse distinct impressions of each eye in single binocular stereoscopic vision, the degree of convergence required by the position of the object must be made to agree with the degree of accommodation which corresponds to the ametropia."

Page 342.—"Two-thirds of the convergence must be held in reserve, in order that one may work with the remaining one-third."

Page 344.—"The further away the object is, the less convergence is required for its binocular perception."

Page 352.—"Notwithstanding their greater mobility, hyperopic eyes do not attain a range of convergence markedly higher than that of emmetropes."

Page 354.—"We know that the two functions are associated in such a way that, for a given degree of convergence, there is always a nearly equal degree of accommodation, and *vice versâ*."

Page 422.—"Not taking into account the distance between the eyes, convergence depends, for all eyes, solely upon the distance of the object."

Page 491.—"Knowing the great amount of convergence required for work, it will not astonish us to find this function so often in default in myopes."

Page 502.—"We must confess that our knowledge as regards muscular asthenopia and insufficiency of convergence is still in its infancy. Insufficiency of the power of convergence is quite a widespread affection, and a frequent cause of asthenopia. It is not by any means peculiar to myopes only. Whilst great advantage is gained by Graefe's test (Method II), it is not true that the latent insufficiency is always brought thus to view."

Noyes writes, page 85 :—"This power and abduction beyond parallelism reaches to a prism of from three to eight degrees in most people, while adduction for distant objects, say at twenty feet, extends to twenty or to fifty degrees, and for the average of persons who have not cultivated their power, it is about twenty-five degrees. If an object come near, adduction increases rapidly, being aided by association with accommodation."

Page 87.—"The most frequent cause of these troubles is error of refraction; and in a general way, weakness of adduction goes with myopia, and weakness of abduction goes with hyperopia. Many exceptions are, however, noted."

Page 91.—"The most common error (muscular abnormalities) is insufficiency of the internal recti. This is most often associated with myopia, but with nearly equal frequency is found in emmetropia, and sometimes, too, with hyperopia."

Page 93.—"But we must sometimes order prisms for permanent wear, either with or without refractive correction, and this is indicated when a muscular error has been detected in testing for the distance of twenty feet."

Williams, page 328.—"Relative divergent strabismus may occur in high degrees of myopia where convergence is impossible, or it may also be due to insufficiency of the internal recti, without myopia—the eye deviating outwards when the internus is fatigued."

The necessity for bringing small things very near to myopic eyes, and thus demanding of the interni excessive strain in convergence, is partially provided for by a greater muscular development; but it is a very frequent cause of insufficiency. For infinity, the optic axes remain parallel; but for near vision, the internal recti act in harmony with the ciliary muscles of the two eyes, and produce a degree of convergence, corresponding to a certain extent with the focal adjustment.

In Carter and Frost, chapter on Insufficiency, we are taught that:—"The relative power of the ocular muscles is of much greater importance than their actual power."

Meyer tells us that:—"Weakness of the internal recti may be observed either in hyperopic, emmetropic, or myopic eyes. It is however most annoying to persons having the last, as they are obliged to bring objects very close to them; they must make their eyes converge for very short distances.

We will now proceed to analyse 150 cases, in which measurements of the abduction and adduction have been made by the method of the vertically displaced images (Methods II and III); and 200 additional cases, in which the abduction and adduction at distance have been measured by horizontally-placed prisms.

In all of these cases, the refraction has been noted under the divisions of emmetropia, when the refraction did not amount to over + 1 D or − 0·50 D, the remaining cases coming under the head of hyperopia or myopia. The presence or absence of binocular vision is also noted. The cases are collected from refraction cases, avoiding any in which there was strabismus, or in which the vision was in any way interfered with by disease or injury.

The 150 cases were tested by the first method, that is, by covering one eye after fixation at thirty centimetres, and in each case there was

divergence of the excluded eye, irrespective of the refraction or measurement of the muscular state by any of the other methods.

TABLE I.

Table of 150 Cases tested by means of Vertical and Horizontal Prisms :—

Emmetropic	64 cases
Hyperopic	68 ,,
Myopic	18 ,,
Total	150 ,,

150 Cases	Abduction =	962°;	average,	6·123
	Adduction =	1717°;	,,	11·446

Vision at Reading Distance.

Homonymous diplopia, ..	12 cases	= 56°,	= 0·373 each	
Crossed ,, ..	124 ,,	= 733°,	= 4·888 ,,	
Balance	14 ,,			

Vision at Twenty Feet.

Homonymous diplopia ..	= 54 cases,	= 144°	= ·94 each
Crossed ,, ...	= 43 ,,	= 96°	= ·64 ,,
Balance	= 53 ,,		

Emmetropia ..	Abduction—64 cases.	392° =	6·125 each
	Adduction ,, ,,	791° =	12·359 ,,
Hypermetropia ..	Abduction—68 cases.	470° =	6·911 each
	Adduction ,, ,,	727° =	10·691 ,,
Myopia	Abduction - 18 cases.	100° =	5·505 each
	Adduction ,, ,,	199° =	11·105 ,,

116 binocular vision	Abduction —each	6·991
	Adduction ,,	13·534
34 not binocular vision.. ..	Abduction—each	4·212
	Adduction ,,	4·545

The cases in this table show that, in testing for the muscular state at reading distance, instead of balance there was heteronymous diplopia on an average equal to a prism of 4°, and at twenty feet there was homonymous diplopia on an average equal to a prism of $\frac{1}{3}$°; and that the average abductive power at twenty feet is equal to a prism of about 6°, and the adductive power to a prism of about 12°; the emmetropes most nearly approaching these measurements, while the hypermetropes have a larger measure of abduction, and a lesser measure of adduction, than the myopes.

Those possessing binocular vision give a greater measure of both abduction and adduction than the average of the whole, while those not possessing binocular vision have their measure of abduction and adduction so much alike as only to leave a small fraction between the two. Absence of binocular vision occurred in thirty-four cases, each of which had the measure of abduction so closely reaching that of adduction as to amount to within a range of 2° prism on either side of the adduction; and in all the cases where the abduction was either over two degrees greater or less than the adduction, binocular vision existed.

Table II.

Table of 200 Cases, in which the Measurement of the Muscular State was taken at Twenty feet, by means of Horizontally-placed Prisms, in which the Refraction was dealt with as previously indicated, and the presence or absence of Binocular Vision noted:—

Average Measurement.	Abduction.	Adduction.
200 cases	5·718	10·826
Myopia	6·108	13·530
Hyperopia	5·382	11·690
Emmetropia	5·787	8·766
Having Binocular Vision.. ..	5·186	12·280
Myopia	6·562	19·066
Hyperopia	4·995	12·914
Emmetropia	6·527	9·448
Not having Binocular Vision ..	8·061	7·650
Myopia	8·642	8·428
Hyperopia	7·666	8·416
Emmetropia	7·732	6·750

Table III.

350 Cases.—Abduction, 5·920; Adduction, 11·136.

Table III is composed of the cases in Table I and Table II, measured at twenty feet by horizontally-placed prisms.

Table IV.

Table of Forty Cases, in which the Measurement of Adduction at Twenty Feet is compared with the Maximum of Convergence in Metre Angles:—

Adduction.	Metre Angles.	Adduction.	Metre Angles.
9	16	31	20
8	9	7	11
22	8	26	17
17	6	7	15
7	12	9	15
7	10	3	20
6	10	32	20
11	9	22	10
9	9	3	6
7	14	7	12
7	16	11	20
7	13	23	20
23	14	3	20
12	18	5	15
10	20	4	10
11	9	5	10
9	15	3	14
19	20	10	20
11	4	15	10
8	20	8	20

This table shows correspondence between these two kinds of measurements.

These, Gentlemen, are the facts I have to bring before you. I will further crave your indulgence while I lay before you the thoughts that have occurred to me whilst working out these cases; these I will put in the form of aphorisms to save space, but with no intention to dogmatise :—

The point at which the measurements of abduction and adduction ought to be taken, is situated on that part of the horopter line at which the eyes meet with the least effort of convergence and accommodation, namely, at a point twenty feet distant from the eyes, on a line drawn from the centre of, and at right angles to, the base line.

The method of measurement by means of horizontally-placed prisms is the only method by which the amount of abduction and adduction can be gauged, so as to be a guide to the power of convergence employed by the individual.

That the measurement of the maximum of convergence does not give a reliable indication of the amount of convergence employed by the individual. (See Table IV.)

That the absence of binocular vision destroys the normal relationship between the external and internal recti muscles. That the normal relationship between abduction and adduction may be regarded as in the proportion of one to two in the untrained. That insufficiency of the external recti so rarely produces distressing symptoms, that its measurement may be disregarded in practice. That asthenopia, from insufficiency of the internal recti, was not found in any case where the measurement of adduction amounted to a prism of 12°.

That the large majority of cases of insufficient employment of the power of adduction may be cured by the judicious use of prisms, as a means of gymnastic training, tenotomy of the opposing muscle or advancement of the insufficient muscle being seldom required.

In conclusion, I wish to point out that the result of the examination of these cases has assured me, that the best indication for the need of treatment in cases of muscular asthenopia is found in the measurement of the adductive power at distance.

A SERIES OF CASES OF RESECTION OF THE OPTIC AND CILIARY NERVES.

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Professor Schweigger's paper on Resection of the Optic Nerve, in Vol. XIV of "Knapp's Archives of Ophthalmology," is undoubtedly the most important contribution to the literature of the subject that has appeared of late years. In it, he deals so fully with the objections which have from time to time been raised against optic neurotomy, and points out so clearly the safety against sympathetic dangers, ensured by resection of a portion of the nerve, that I should be merely paraphrasing his sentences, if I were to detain you by entering into the subject at any length.

In September 1886, Dr. Bell Taylor published in the *British Medical Journal* a report of thirty-one cases in which he had performed the operation, and his results, together with Schweigger's paper, induced me to adopt it. Any alternative that will secure protection to the fellow eye in cases where there is risk of sympathetic inflammation, which stops short of removal of the injured organ, will be equally acceptable to the patient and to the surgeon.

Excision, though it often terminates the patient's troubles in the way of pain or risk to the other eye, is very frequently the beginning of a series of annoyances, in the way of purulent discharge from the conjunctiva and discomfort, with an artificial eye; or lachrymation, and collection of dust and foreign bodies in the orbit, without one.

Of late, Mules' operation of introducing an artificial vitreous has been brought prominently forward, but it does not obviate the drawback of having to wear an artificial eye, and merely improves the stump on which the shell rests. Whether it secures immunity from sympathetic trouble remains to be seen; but there is no doubt that the class of cases, where the lids are too irritable to stand an artificial eye after excision, will stand it no better because it is supported by a metal ball inside the stump.

In a very large number of cases calling for operation, the eye to be dealt with is as sightly, if not more so, than the artificial eye which replaces it; and even when this is not the case, most patients prefer to retain their eye, unless the disfigurement is extreme.

I have operated on fifteen cases since November 1886, in all of which I should otherwise have had to excise, and had once begun the operation, but been obliged to excise. This case was one of severe injury to the cornea and sclera from glass, which had healed imperfectly, and as there was very severe pain, I operated at once. During the operation the wound opened, and I was obliged to remove the globe. All of the other fifteen cases, except the last, which is only recovering from operation, and of which I cannot speak, have been most satisfactory in their results. I have seen no material return of corneal sensibility, and have seen as much relief of sympathetic irritation in the other eye as if I had excised. In Case X, sympathetic iritis set in on the sixteenth day, but there had been sympathetic irritation before the operation, and excision would probably have been no greater safeguard.

So far as the cosmetic result of the operation in these fourteen cases is concerned, the appearance, except in Case X, was the same as before interference, and I have no reason to suppose the last case will do any worse than the others. Of course, the operation is not adapted to every case; but in many instances where excision is now practised, I have no doubt a freely movable eye of presentable appearance might be preserved if resection of the nerve were adopted, and the cosmetic effect is known beforehand, which is not the case with excision.

I perform the operation by dividing the tendon of the internal rectus, and freely dividing the conjunctiva and capsule of Tenon upwards and downwards at the same time. The middle needle of three on one silk is then passed through the divided muscle from within outwards, as if for advancement of the muscle, and the suture is drawn across the bridge of the nose out of the way. The globe is then rotated outwards by means of a small sharp hook, and the nerve divided as far back as

possible with a curved scissors. A strabismus hook is slipped round the portion of the nerve attached to the globe, and used to rotate the eye till the posterior pole appears in the wound, when the nerve is snipped off close to the sclerotic, and the ciliary nerves cut off short. The globe is then replaced, and the rectus stitched forward to the conjunctiva above and below the cornea. The lids are carefully closed, and a compress of lint, wrung out of carbolic oil, used as a dressing. The stitches cause no inconvenience, owing to the insensitiveness of the cornea, and are removed on the third or fourth day. The last operation, from introducing the speculum to pinning the bandage, took twenty-one minutes; but if the hæmorrhage is smart, it may cause delay in getting back the eye into place, and make the operation more tedious. The following notes of the cases speak for themselves, and do not require any further explanation :—

Case I.

C. P., aged 8. Oc. Dex. was lost some months previously from a blow from a stick at which he was chopping on the ground. The stick flew and struck the eye, penetrating the cornea and wounding the lens. At the time of operation, he had an occluded pupil and anterior synechia. The cornea was somewhat shrunken, and the globe was very sensitive, especially in the ciliary region below. Oc. Sin. was showing signs of sympathetic irritation. There was sufficient intolerance of light to prevent ophthalmoscopic examination, and a great loss of accommodation with some conjunctival irritation. Half an inch of the nerve was excised in November 1886. When last seen, in September 1888, he was attending school, and the left eye was normal in every respect. The injured eye had perfect movements, but hardly any corneal sensation, and would stand stroking with a piece of paper without winking. The eye was absolutely quiet, and there was nothing to show that an operation had been performed.

Case II.

H. F., æt. 35, sailor, presented himself on November 10, 1888, having had his right cornea ruptured right across, below the centre, by a blow from a marline spike eight weeks before. The iris was adherent in the cicatrix, and the projection of light was bad. Oc. Sin. V. = $\frac{6}{6}$, some letters, and J 1 with effort. Ophthalmoscopically, fundus normal, but very sensitive to light. He was admitted to the hospital for observation, and some days later, the intolerance of light increasing, $\frac{1}{3}''$ of the nerve of the injured eye was resected. He left the hospital a fortnight later with perfect motions of the globe, and very slight corneal sensation. The intolerance of light in the other eye had quite disappeared.

Case III.

T. B., aged 17, on November 24, 1886, gave the following history :—Two months before, in opening a sodawater bottle, it burst, and one of the fragments struck his right eye. There had been considerable pain, which had gradually subsided, but vision had not returned. There was a long cut from the equator inside, running forwards and rather downwards to within two millimetres of the corneal limbus.

This was firmly healed by a somewhat depressed cicatrix. The cornea was normal, but the iris was pressed forwards against it in its inner and lower portions. The lens showed commencing opacity in its outer lower quadrant. The retina was detached on its inner side, and there was a considerable cyclitic membrane along the cut, involving the retina. The nerve was very hazy, and the vessels of the attached portions of the retina were very hazy. In the macular region, was an exudation similar to that in albuminuric retinitis. V = Fingers at 0·3 millimetres, T - 3; Oc. Sin. V = $\frac{6}{6}$ and J 1. After some correspondence with his parents, between $\frac{1}{8}''$ and $\frac{1}{4}''$ of the nerve was excised on December 6. The stitches were removed on the 9th, when the eye was quiet, movement good, and cornea insensitive. On the 10th, he had an attack of acute rheumatism, and a temperature of 104°, but by the 21st he was able to return home. The eye was then quiet; the pupil was dilated and fixed, and the cyclitic membrane visible behind the lens; the cornea was insensitive to slight irritations, such as touching with paper, but he was conscious of firmer pressure. A satisfactory report was received from the patient's father two months later, since when he has not been heard from.

Case IV.

Mr. G., aged 48, applied December 21, 1886, saying that he had been struck in the left eye twelve weeks before by a piece of iron, which flew from his hammer. Oc. Dex. V = $\frac{6}{18}$, fundus normal; V Oc. Sin. = doubtful perception of light; T − 3. There was a linear scar from two to three millimetres long in the corneo-scleral junction above. The iris was pressed forwards almost to the cornea by the lens, which showed streaky haze in its centre; the retina was almost entirely detached. He was admitted to the hospital, and $\frac{1}{4}''$ of the nerve resected. He made a good recovery, and left with an insensitive freely moving globe. The right eye had improved to about V = $\frac{6}{12}$, and he did not care to have his manifest H corrected, to get better sight than this.

Case V.

J. W., aged about 60, was operated on in the Dunedin Hospital, in 1886, for a large orbital sarcoma which displaced the eye down and outwards, so that it lay outside the orbit below the outer canthus, completely hidden by the lower lid. He stipulated that the eye should on no account be removed, so, though the tumour was adherent to the upper inner posterior quadrant of the globe, the sclera was carefully scraped and the eye retained.

In January 1887, he presented himself, complaining of great pain in the eye, which was of stony hardness. The lens was opaque when he first came under observation, and there was no perception of light. He still refused excision, so $\frac{1}{2}''$ of the nerve was excised without difficulty, and some months later he remained free from pain and with a presentable eye. He was lost sight of about the middle of the year.

Case VI.

Mr. Wm. G., aged 45, presented himself November 8, 1886, stating that he had been struck in Oc. Dex. by a "spark," when quartz reefing

nine months before. V subsequently was nearly normal till three or four months before the visit, when it began to fail, and the iris began to change from a blue grey colour to a light brown.

When seen, Oc. Sin. was normal, V = $\frac{6}{6}$, iris light blue. Oc. Dex. V = Fingers at 0·5 millimetres. The cornea showed a cicatrix two millimetres long, running inwards and downwards from the outer limbus. The iris was light brown in colour, showing slight indications of the old blue colour near its base, inside and above. It showed a laceration behind the corneal cicatrix, corresponding with it. The anterior capsule was completely covered with a fine powdery cloud of pigment spots, denser in some spots than others. The lens behind showed a diffuse haze. He projected light well, except on the temporal part of the retina, where the projection was slow and uncertain. Being disinclined for operation, he was told to remain under observation.

He returned on April 9, 1887, suffering from headaches. The lens was now completely opaque, and the projection of light very bad. V Oc. Sin. $\frac{6}{6}$. As there was no doubt as to the presence of a foreign body in the eye, he consented to operation, and on April 13th, $\frac{1}{4}''$ of the nerve was resected. He was very drowsy on the two following days, but on the third day, when the stitches were removed, he was much brighter. On the fourth day, there was doubtful corneal sensation, and motion was good in all directions except outwards.

On the 18th, outward rotation was better, and he left for home.

On the 27th, he reported that he had been exposed to cold, and had suffered severe pain in the eye, which had ceased two days before his return. Rotation outward was slightly defective, but was good in other directions. The cornea was very slightly sensitive, and the eye was quite quiet. Oc. Sin. normal. He has not returned since, but his employer has at intervals reported to me that he is well and free from discomfort.

Case VII.

H. L., a miner, was operated on in April 1887, for a rupture of the cornea from side to side. He was discharged from the hospital a fortnight later, with a freely movable stump and doubtful corneal sensation.

Case VIII.

C. B., aged 33, miner, had his right eye injured by a blasting accident in February 1887. On April 20, the stump was very tender. The cornea was much cut, one cut extending into the ciliary region above. The iris was incarcerated in the corneal wounds on its temporal side. Lens opaque. T − 2; V = P. light; Oc. Sin. V = $\frac{6}{9}$ letters. Some intolerance of light. The right nerve was resected on April 21st, and on May 13th he returned to work. V Oc. Sin. = $\frac{6}{6}$ and J 1; intolerance of light gone. The injured stump was not tender, looked fairly quiet, and had an insensitive cornea. He reported two months later, and his condition was then satisfactory.

Case IX.

Master T. C., aged 7. First seen on May 12th, 1887. A soda water bottle had exploded three weeks before, and a fragment had

entered his left eye. His mother was with him at the time, and drew out a piece of glass which projected from between the closed lids. There was a depressed scar from the ciliary region outside, extending down and back to the equator. Over the ciliary portion of the scar, was a granulation. The retina was extensively detached. T – 2. No perception of light. The stump was excessively tender to the touch. Oc. Dex. normal. The nerve was resected on the same day; the stitches were removed four days later, and on the 20th he returned home with a painless insensitive stump. Two months later, the eye was reported as being still bloodshot, but free from pain or sensibility, and his medical attendant (who is a careful observer, and occasionally writes to me) has not since reported anything wrong.

Case X.

Thos. S., aged 30, presented himself on January 6th, having had his right eye injured the previous day. He was sewing sacks, when the twine broke as he was pulling it, and the packing needle entered his right cornea. V = P. light; lens opaque; T. low n. The wound was across the pupillary area, and the iris was incarcerated in the outer part. He was admitted to the hospital, and the anterior synechia was cut, and a considerable portion of the opaque and swollen lens was extracted. The case, however, ran on to plastic cyclitis, and I advised resection of the nerve. This he refused for some weeks, but consented in the latter part of February, as he felt his left eye failing, though there were no recognisable changes in it. The operation was attended by severe hæmorrhage behind the globe, which forced it out between the lids. After very great difficulty it was reduced, and the lids closed. On the following day the eye was again protruding, and could not be thoroughly reduced, but steady pressure was kept up over the globe, which in about a fortnight was in good position, though outward rotation was very defective. The cornea was infiltrated with pus on the third day, but cleared up after threatening to necrose for over a week. On the 16th day, he had a mild attack of sympathetic iritis in the left eye, which, however, readily yielded to treatment.

On May 23rd, he had V $\frac{6}{12}$ without lens, $\frac{6}{6}$ letters + 1 D Oc. Sin., and the right eye was a presentable stump, with good motion, except outwards; but outward rotation seemed to be improving. The cornea of the stump was absolutely insensitive.

Case XI.

C. B., aged 8, was operated on in the hospital on April 18, for a perforating wound of the ciliary body Oc. Dex. Operation and recovery were normal, and he was discharged in a fortnight with a painless, insensitive, freely movable stump. Oc. Sin. normal.

Case XII.

Mrs. S., aged about 45, was operated on in the hospital in June last. She had absolute glaucoma in both eyes, for which iridectomies had been done some years previously. She was suffering intense glaucomatous pain in the head from the right eye. During the operation, the ciliary nerves were found to be enormously enlarged, and fully $\frac{3}{4}''$ of

them was removed. She later complained much of pains, which she could not locate, in the back and stomach and globus hystericus. These symptoms were referable to the menopause, but the glaucomatous pain ceased absolutely from the time of operation. When discharged, except by some conjunctival redness, the eye operated on could not be distinguished from the other.

Case XIII.

C. B., aged 52, lost Oc. Sin. thirteen years ago by an accident. He had severe inflammation, and was many weeks in hospital. He has always since had tenderness in the eye, and has been liable to severe pain from such trivial causes as touching it while washing his face. When seen on August 28 last, he said the eye had been very painful for two months, and for four nights he had not slept. V. no P.L. T−? great ciliary tenderness. There was a scar $\frac{1}{4}''$ long running through the outer limbus of the cornea into the ciliary region, in which the iris was incarcerated. The pupil was drawn to the edge of the cornea, and the lens was opaque. Great ciliary congestion and duskiness. Oc. Dex. $V = \frac{6}{12}$; nerve distinctly hyperæmic. The nerve was resected next day, and the pain ceased at once. He was discharged a fortnight later with a freely movable, quiet, insensitive stump. The right eye was quiet, and V had gone up to letters of $\frac{6}{6}$. His delight at being able to wash his face, without hurting his eye, was quite comic.

Case XIV.

Master W. A., aged 15, was brought to me on August 27 last, having had his right eye injured by a steel fork ten days previously. There were two perforating wounds of the cornea, at the level of the upper pupillary margin, to which were fixed two fine threads of iris. The pupil was contracted and much bound down, and there was great ciliary congestion. Lens opaque. T.n.; projects light badly. Every effort was made to dilate the pupil without success, and the boy's father consented to resection, when the left eye began to lose its accommodation. The wounded eye then had T − 1, ciliary tenderness, a completely occluded pupil, and iris bulging forward. Oc. Sin. $V = \frac{6}{8}$ and J 1, slowly and with difficulty. The nerve was resected on September 24, and there was some proptosis, but the lids covered the lids after some trouble. On the 29th, the stitches were removed; some conjunctival sensation, but none in cornea. October 1.—The bandage was removed. October 17.—When last seen, eye quiet and movements perfect; no corneal sensibility. Oc. Sin. is strong, and bears the light well, $V = \frac{6}{6}$ and J 1 easily.

Case XV.

R. S., aged 58, had his right eye injured by gorse five months before he applied at the Dunedin Hospital, on November 16, 1888. The globe was then flattening under the recti, and was in a condition of chronic cyclitis, and excessively tender. The lens was opaque, and the iris adherent all round the pupillary margin, and vision was absolutely destroyed. The other eye was "feeling weak," but had no inflammatory condition. He was suffering great pain over the right side of the head,

radiating from the injured eye. Three days ago (November 19) three-quarters of an inch of the optic nerve was excised, and the proptosis, after the operation was complete, was nearly half an inch before the other eye, leaving fully one inch between the end of the nerve in the orbit and the globe. There was pain on the following day, which ceased on re-adjusting the bandage, and has not returned. To-day he is quite easy, and the proptosis is diminishing.

SANDY BLIGHT AND GRANULAR OPHTHALMIA.

By T. Aubrey Bowen, L.K. et Q.C.P.I., M.R.C.S. Eng.

In this paper I have used the term "Sandy Blight" (muco-purulent ophthalmia), as it is the popular term for perhaps the best known and the most frequently occurring disease in these colonies. At certain seasons of the year, notably in the middle and late summer months, it commences in a sporadic form, occasionally becoming epidemic in limited areas, and attacking a whole district, so that the State schools have from time to time to be closed for some weeks. Both in the endemic and epidemic forms, the sequelæ of this disease have been by far the most frequent cause of blindness in the colonies; not on account of the serious nature of the disease at its commencement, but owing to its being allowed to continue in a chronic form, inducing trachoma, pannus, ulcers of the cornea, and all the disasters resulting therefrom. Certain varieties of trachoma are so intimately associated with this disease, that it will be difficult to make any observations on the subject of granular ophthalmia, as it is oftenest seen in the colonies, without also glancing at this so-called blight.

The subject of trachoma, or granular ophthalmia, is a most difficult one to deal with, both as regards its causation, its essential nature, and its treatment. The nomenclature is both imperfect and deceptive, and the words "granular ophthalmia" and "trachoma" are used by some as synonymous, and by others as expressing different diseased conditions. Others again give names in accordance with the particular theories they hold as to their distinctive characteristics, such as follicular and papillary granulations, and hypertrophy of the papillæ—these three forms being held as essentially different diseases. Others, as Von Arlt, regards the blenorrhœa of gonorrhœa and that of ophthalmia neonatorum as the same disease in the acute form as follicular and papillary granulations in the chronic form; and that these diseases only differ from one another partly by the rapidity of their course, and partly by the changes that take place in the conjunctiva. M. Wecker considers what he calls true granulations as new deposits analogous to tubercle. There is great diversity of opinion as to whether these granular bodies are new formations, or alterations of the adenoid tissues already existing. At present, I do not find any satisfactory evidence as to these granules being the product of a specific micrococcus, and having a distinct origin or running a different course from the other

altered states of the conjunctiva in this affection. I cannot agree that we are in a position to draw deductions as regards nomenclature or treatment from the present uncertain state in which the question stands.

Sattler, Michel, and one or two others believe that they have found a specific micrococcus in the granular bodies, and that they have reproduced a similar disease with the cultivated germs; but their conclusions have not been sufficiently corroborated by other investigators. I am perfectly prepared to believe that this disease, in common with a very large number of others, is caused by micro organisms; but, granting that this may be true, the question still remains open—whether these same organisms are not also present in other forms of the disease. The more we consider the study of micro-organisms in connection with disease as of paramount importance, the more cautious we should be in admitting all the numerous so-called discoveries as proven, until they have been subjected to the test of time, and the unanimous concurrence of a large number of experienced workers in the same field.

I do not find that the usual descriptions of trachoma at all accurately represent the forms of the disease as it exists in the colonies; nor are the various gradations nearly so clearly marked as usually described. On this account, I have thought it might be of interest to give my impressions of the disease, after having watched its progress in Hospital and private practice for twenty-five years; during which time I have had a very large number of cases pass through my hands, and have been able to contrast it with the disease as I have seen it in Egypt, Ireland, and England (although in England it is rare, in comparison to its frequency in the other countries). In these colonies, it is perhaps more prevalent than in any part of the Globe inhabited by Europeans.

I am inclined to the belief, that the various forms of trachoma are modifications of the same disease, but differing in degree; and that one form may reproduce another form, modified by the manner of transmission, and by the surrounding circumstances of the case. Some years ago I attended, on behalf of the Government, a very serious attack of purulent ophthalmia in the State Schools for children, in which many hundreds were attacked, and a large number lost one or both eyes. I have already described this epidemic, and only mention it now to point out that the forms of trachoma left after the subsidence of the disease were markedly different. In some, there were the well-marked sago grain bodies; in others, these were never visible at all (and I watched the progress of all the cases from day to day), but only the enlarged and hypertrophied villi and conjunctiva. Through the kindness of my *confrère*, Dr. J. P. Ryan, and in conjunction with him, we examined over four hundred of the children at Abbotsford. Amongst a large number of them, trachoma was present in a greater or lesser degree. In some, the sago grain bodies were visible, but in by far the greater number they were not present; and in the cases in which they were seen (a strong lens was used), the enlarged villi greatly predominated. Blight has several times visited this school, and a large number of the children have been attacked, but not in a severe form, or as an epidemic. I cannot help thinking that it would be much better, whilst there is any serious difference as to the causation and essential nature of this disease, not to give a name or names in

accordance with the particular theory of its nature or development, but for a time at least to describe the conditions simply as we see them, and on these grounds I should like this disease of granular ophthalmia not to be subdivided, but all forms to be classed under the sole name of trachoma, or trachomatous eyelids—signifying simply rough eyelids.

I will now give a brief outline of the disease popularly known as sandy blight in these colonies. It is simply a muco-purulent conjunctivitis, and commences with a slight redness and itching of the conjunctiva of the lower eyelid. This soon extends to the upper lid and the globe; and on the second day, the eyelid swells more or less, according to the severity of the case. There is usually a considerable amount of pain about the third or fourth day. On everting the upper lid, it is found somewhat roughened by the enlarged and swollen papillæ, a muco-purulent discharge exudes from the eye, but unless in a very severe case, it is more of a mucous than a purulent character; frequently however, in constitutions debilitated by drink or disease, and with unhealthy surroundings, the disease takes on a decidedly purulent character, and the resulting trachoma (supposing the case is not properly treated) and pannus are of a far more serious character than in an ordinary case.

All the prominent symptoms fade away in about a fortnight with ordinary cleanliness, and not much discomfort remains, and in this freedom from any serious annoyance lies the danger. In a large number of these untreated cases, the disease continues in a chronic form; a slight mucoid discharge comes from the eyes during the night, or in a glare or strong wind; and if the lids are examined, the enlargement and thickening of the papillæ can be seen to be slowly progressing, exudation of lymph is taking place into the tissues, thickening the lids, and in course of time, if nothing is done, pannus, ulceration of cornea, and all the other sequelæ take place; whilst in this chronic condition, as in gleet and other diseases of mucous membranes, exposure to cold, drinking, and other like causes, renew it with much of its original vigour.

Blight is much more common in the country than in the towns, and amongst children than grown up people. It is rare except in the summer months, and is in a worse form at a late than at an early period of the summer. In looking for the causes of this disease, we must separate those which give it a character endemic to a particular country or district, and those which immediately concern its production in an epidemic form in a limited area. There can be no doubt that the usual causes inducing inflammation of mucous membranes are operative, as cold air draughts, dust, and especially violent alternations of heat and cold: and in the case of the eyes, bright light will occasion the affection. A bright sun (especially when reflected from a bright-coloured sandy surface) is without doubt an irritant to the eyes, and predisposes them to disease. The dust also, especially when it exists in an almost impalpable powder, acts very injuriously. We know that damp is a great medium for carrying the poison of many infectious diseases; and I consider one of the chief causes of the propagation of this affection by contagion is an atmosphere loaded with moisture, whether produced by evaporation after a hot day, or from the moisture exhaling from the bodies of a large number of people crowded together in badly ventilated sleeping apartments. Both these causes may act at once, and usually

exert their influence on eyes predisposed to take disease from previous exposure to the sun, dust, &c., and in constitutions debilitated by fatigue, drinking, improper food, or insufficient exercise. One of the principal causes of the disease in its simple form here is exposure of the eyes to the sudden changes of temperature in the early morning. This change is very great in the summer in our climate; and in the country districts, people, especially the young, often sleep during the hot weather in exposed places, where they are subjected to its full force. In towns, they are usually in rooms more protected from atmospheric influences. Formerly, in the early days of gold-mining, when teams with large parties of miners, &c., went to the diggings, sleeping in tents *en route*, a large number of the party almost invariably had blight. It is a common practice amongst the Tent Bedouins to cover their eyes at night in order to guard against a similar change that takes place in Egypt.

The great decrease in blight and its consequences, that has taken place of late years from year to year, I attribute in great measure to the improved conditions in which the farmers and miners now live. They generally have fairly comfortable cottages, instead of log huts or tents. This disease is, without doubt, both contagious and infectious, but it is certainly by no means exclusively or chiefly to be attributed to this cause. My own opinion is, that it is highly contagious, but infectious only in a minor degree, and in a suitable nidus. *

I have given an outline of this disease, as I consider it is by far the most frequent cause of trachoma in these colonies, and of the irreparable damage that may be caused by neglecting its treatment—a disease so easily cured, and if untreated, leading to such disastrous results.

This neglect is now being, to some degree, remedied by the greater facilities the country people have of reaching a doctor, and by the greater knowledge the profession now possess of the treatment of the disease. For my own part I have found fomentations, with or without leeches, in the acute stages; and alum washes, with or without weak nitrate of silver drops, in the later stages; with absolute cleanliness throughout, amply sufficient in nearly all cases to effect a cure, and leave no trace of enlarged papillæ behind. In speaking of trachomatous (or rough) eyelids, as I have before stated, the sago-like bodies or granules are comparatively rare in this country, and are intimately associated with the other forms of trachoma. I have seldom seen them alone; and it is very rare here to see a case of trachoma, which has not been preceded by some acute or long-continued sub-acute form of conjunctivitis, and generally no history of previous weakness of the eyes can be gathered.

In the large Military Eye Hospital at Cairo, I have frequently seen cases of old trachoma, with the conjunctiva smooth and bright, but studded with small, hard, round seed-like bodies, embedded in the conjunctiva, and which can be picked out with the point of a knife, and when placed on the palm of the hand can be rolled about like marbles. These I have never seen here.

* By *Contagion*, I mean immediate contagion, communicated through a material and visible substance.

By *Infection*, mediate contagion communicated through the medium of the atmosphere, and invisible substances suspended in it.

Of the trachomatous patients who have passed through my hands, I have not found any great predominance of a particular nationality. It is rare amongst the Jews, which I attribute to so few of them living in the bush, and out of reach of medical attendance; and it is certainly rather more prevalent amongst the Irish, this I attribute to an exactly contrary reason—so many of the poorer classes of this nationality being small settlers, and gaining a mere subsistence.

Pannus, here as elsewhere, is a very common accompaniment of trachoma; and ulcers of the cornea also are far commoner here, in my experience, than in England, as a sequela of the disease, and are the most frequent cause of blindness, as they render it difficult, and often impossible, to properly treat the trachoma. I do not think it is of much use to attempt to cure the pannus until the trachoma is sufficiently recovered to enable us to beneficially treat the two together. The cicatricial bands in the conjunctiva of the upper lid, occasionally met with in old cases, are as often, I think, caused by the free use of solid caustic—which was formerly a common method of treating trachoma—as by contraction caused by changes in the granules.

I do not intend to say much as to the treatment of this disease. It is sad to contemplate the infinite number of remedies that have been tried, extolled as almost specifics, and now fallen into utter disuse, or only used once in a way as of doubtful utility, and it has a tendency to shake one's faith in the wonderful results constantly reported of new methods of treatment. Of course, this may be accounted for to some extent by the fact that in this, as in other diseases, the same remedies act in a very different manner in different persons, and in accordance with the various phases of the disease and of the constitution. I have not found shaving the tops of the villi of much use, although when they are very large and vascular, the bleeding may do good sometimes; a better plan is scarifying. Nor have I found much benefit from the actual or thermo cautery. I have not used the electric cautery sufficiently to form an opinion. Dr. C. Bell Taylor has adopted a method (in accordance with the bacteria theory), of squeezing out the granules and scarifying, and afterwards applying liquor potassæ. I very rarely indeed meet with cases in which the sago grains are sufficiently isolated or numerous, and unaccompanied with enlarged papillæ, to apply this treatment with any hope of success.

He also in some cases, in common with others, excises the retro-tarsal fold. I have made trials, in some cases prolonged ones, with tannin, perchloride of mercury, and others of the numerous forms of treatment that have been from time to time advocated, such as the aquæ chlorinatæ so strongly recommended by Graefe, Pagenstacher's yellow oxide of mercury ointment, Worlomont's—cantharides, sulphate of copper, and glycerine; Bowman's spirits of turpentine and olive oil, &c. &c.; and although they are most of them undoubtedly useful in certain cases (I have found the perchloride particularly so), I have as a general rule come back to the three old remedies of the mitigated nitrate of silver stick, applied lightly to the lids, and afterwards neutralised; followed by the sulphate of copper, divine stone, or a brush over with a ten or twenty grain solution of nitrate of silver, neutralised after a short time, as the most reliable remedies in bad cases of trachoma. Local depletion and counter-irritation are of course used from time to time.

Jequirity is undoubtedly a valuable remedy in extensive pannus; the effects produced are somewhat alarming in appearance; but unfortunately, the cases in which it is safe to use this remedy are far from numerous, as they are often accompanied with corneal ulceration, either existing, or with the scars from former ulcers; in such cases it would not be prudent to employ jequirity; the effect, however, as with inoculation of pus, seems to be rendered safer when preceded by the operation of peritomy.

Peritomy I have very frequently performed, and have seen the results after months, and in some cases years. The effects are very slow in arriving, and I do not consider the results as a rule satisfactory. The pannus is often greatly cleared away, but a general corneal haziness is often left, in many cases permanently.

I do not know any remedy that supersedes prolonged treatment, patience, and extreme care, and watching, the general health being very carefully attended to, and the frequent febrile attacks to which these patients are liable combatted. With these means, I think almost all cases are curable if the pannus is not too thick, and no ulceration exists.

We have here a very large number of cases of young people, with only a moderate amount of trachoma and pannus of not a very pronounced character. The health is generally much impaired, from the constant suffering and misery. In these cases, for some years, I have been in the habit of using the following method of treatment:—

I tell them to place as much as two pin heads of quinine, in the finest possible powder, between the lid and the eyeball every morning; and at night, a drop of solution of sulphate of atropine, two grains to the ounce. I also give them a tonic, usually syrup of the iodide of iron, and tell them to bathe the eyelids for a minute or two, three or four times daily with cold water. After a short time, I have found the pannus to disappear in a satisfactory manner, and the conjunctiva to become of a pearly whiteness; the trachomatous condition of the lids at the same time slowly but satisfactorily lessens. I am so satisfied with this method of treatment, that I am anxious my *confrères* should give it a trial. It of course does not succeed in all cases, and does not seem suitable in grown up people.

GRANULAR CONJUNCTIVITIS.

By R. B. Duncan, F.R.C.S. Ed. (by Exam.), Kyneton.

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Granular conjunctivitis is a disease that has always occupied a prominent position in ophthalmology. It is not so much that it is a disease which often proves fatal to useful vision, but that it is one almost invariably of long duration, most difficult to cure, and when apparently cured, liable to frequent relapses.

This disease may be said to have made its first appearance in Europe in 1798, when it was imported by the French army on its return from

Egypt, hence the name "Egyptian ophthalmia," by which it is sometimes designated. There is reason, however, to believe that in Italy at least, it was known long anterior to this date. At the periods of which I speak, its propagation was easy, and its results wide-spread and disastrous.

It is only within recent years, however, that its causation and mode of propagation, the various social conditions with which it was associated, its insidious beginnings and rapidity of spreading in reformatories, barracks, and prisons, or wherever large collections of people were congregated under bad hygienic conditions, have been investigated and studied with a care and discrimination which leaves little to be desired.

The chief causes, then, of this disease, in its epidemic form at least, may be traced to the "overcrowding of human beings, together with filth, impure air, want of proper food; and, in fact, deficient sanitary arrangements in general are doubtless the most prolific sources of this disease, and are capable of not only causing conjunctivitis in men, but also in the lower animals."*

What I wish to speak of to-day, more particularly however, is the granular conjunctivitis in its isolated forms, as we generally meet with it in ordinary practice, in contra-distinction to its existence in communities to which I have just alluded. And first, as to its name. There is no term in ophthalmology which is more confusing, or which more absolutely misrepresents a disease than this. As if the designation "granular conjunctivitis" was not enough to make "confusion worse confounded," other terms have crept into our nosology; hence the names trachoma, Egyptian ophthalmia, military ophthalmia, follicular, papillary, and even vesicular conjunctivitis. I am not prepared to offer any suggestion in the way of curtailment of this formidable nomenclature, but it is to be hoped that systematic writers on the subject will, in the near future, find a means of designating it more in keeping with its pathology.

The appearance of an eye affected with granular conjunctivitis is not always characteristic, and will depend to a great extent on the stage of development reached by the granules. At times, a magnifying glass will be required to make them out. In the majority of cases, however, they are observable as small semi-transparent bodies, occupying chiefly the upper and lower tarso-orbital folds; but, by preference, the latter. They often attain the size of boiled sago grains, to which they have been compared.

What, then, is their structure, and what are the pathological conditions producing them? This question is not easily answered, since opinions regarding the histology and pathology of trachomatous granules are at present in a transitional state. They consist, according to Pollock, "of collections of lymphatic corpuscles, enclosed in the meshes of a delicate reticulum, the whole being invested by a capsule, formed by a condensation of the normal tissue." More recent investigations, however, have shown that their anatomico-pathological structure is not quite so simple. Is a granule in fact a perfectly new formation, or a mere hypertrophy of a pre-existing structure? It is a new formation undoubtedly, and not only so, but the seat of a specific micro-organism or trachomacoccus.

Considering the nature of the disease, and its intensely contagious character when combined with a discharge, something of this kind was

* "A Manual of Diseases of the Eye" (Macnamara).

long suspected. Its important bearing on the subject of treatment will be discussed further on. By adopting this view of the matter, some features of the disease, which have always been more or less inexplicable, are easily explained. It is quite evident that the question is chiefly a bacteriological one, and from that side only will it advance. A distinguished writer (Arlt, "Pathology of the Eye") on the subject tells us, that the chief characteristics of a granule are "tubercle-like aggregations of round cells;" while another informs us that they are purely composed of lymphoid cells. Both opinions are to a certain extent correct, but they do not advance our knowledge of this important matter in any way. Any elucidation of this question then, from a new standpoint, is to be welcomed. It may be stated that the human conjunctiva at least contains no lymphatic follicles. "Small collections of lymphatic cells may be found in it, arranged in clusters." A trachomatous granule being a new formation, what are the conditions of its development? Given a healthy human conjunctiva, to which some of the discharge from one affected eye has gained admittance, and what is the course of events? Modern bacteriological research has placed it beyond a doubt, that the disease depends on a specific trachomacoccus, which finds its special seat of development in the sub-epithelial connective tissue. How does it get there, and in what manner is it possible that it can penetrate an apparently intact and healthy membrane? Various conjectures have been hazarded to account for this, but with as yet no satisfactory result. "Once introduced, however, the changes begin, and like many diseases due to a micro-organism, have a distinct period of incubation; and it is not till the end of the second week that the external manifestations of the disease are visible. If a section of a trachomatous granule be examined, say about the tenth day from the entrance under the conjunctiva of the specific germ, it will be found to consist chiefly of white blood corpuscles and lymphatic cells, having no particular arrangement, and no definite investing membrane. As it attains maturity, however, the collection of cells is permeated by a fine reticulum, and acquires an investing membrane. The early growth and development have not yet been worked out with that accuracy of detail, which the importance of the subject demands. As the result, however, of recent investigations, we are justified in assuming—

(1) That granular conjunctivitis is a disease due to the development of a specific germ in the conjunctiva.

(2) The specific germs penetrate into the sub-epithelial connective tissue, and produce there an irritation capable of determining the migration of white blood corpuscles from the neighbouring blood-vessels.

(3) The parasitic germs collect in the protoplasm of these cells, and the cells themselves by a series of modifications produce the finely interlaced fibres which constitute the delicate connective tissue stroma of the granulations.

(4) A granulation, in all its surroundings, is formed by new elements proper to it alone."*

The papillary variety of conjunctivitis is essentially different to that just alluded to. Here we have a true hypertrophy of existing structures,

* Staderini, "Annali di Ottalmologica," Anno xvi., Fasc. 5 e. 6.

modified according to whether they are merely an accompaniment of the follicular variety, or the result of some preceding purulent or gonorrhœal inflammation. In the first instance, they are usually hard, and somewhat whitish ; in the latter, soft and succulent. In structure, they do not differ from papillæ elsewhere. When they exist in any considerable quantity in conjunction with the follicular variety, the term "mixed granular conjunctivitis" will sufficiently indicate the connexion. Though scarcely alluded to by some authors, there can be no doubt of their great importance, and the damage that they are capable of inflicting. While always due to some present irritation or previous inflammation, they are often, on that account, most rebellious to treatment.

There is a form of the disease we are discussing, which has been termed "malignant," and which is fortunately rarely seen. In the so-called malignant form, we have a combination of papillary and follicular conjunctivitis, on a most extensive scale. The whole of the conjunctival membrane, even including the cornea, is the seat of granulations; and the latter, in addition, is generally in a state of hopeless pannus. The chief feature of this disease is, however, seen in the lids. These are thickened to an extraordinary extent, and the tarso-orbital folds almost filled with fleshy-looking masses. What are the causes of this formidable affection, and do we find an ordinary granular conjunctivitis progress to this almost hopeless condition? In my experience, this malignant variety shows some exceptional aspects from the first, in marked contra-distinction to the ordinary variety. This is generally shown by the rapid spread of the granules, or their almost simultaneous appearance on conjunctiva and cornea, the lids keeping pace in their thickening and induration. The real cause, if cause there be, for what is possibly after all only an aggravated degree of a less serious trouble, is quite obscure.

Granular conjunctivitis falls into two well-marked divisions, regarding which it is necessary to have the clearest possible understanding. In the one class, we have granulations in various states of development, without any perceptible discharge, and with little external manifestations to indicate their presence. In the other class, we have granulations attended by a discharge. This discharge, as we all know, is distinctly contagious, and can give rise to granular conjunctivitis in a healthy eye. Eyes belonging to the first category are exceedingly prone to be affected by the second; hence the imperative necessity in public institutions, such as reformatories, of thorough inspection and careful isolation on the slightest appearance of the disease. Finally, the non-discharging kind are liable to inflammatory action at all times. These distinctions are valuable, no less in private than public practice. I had a patient lately who suffered from the disease, and had a mild discharge, from whom enquiry elicited the fact, that other members of the same family were suffering from what she termed "weak eyes." Further investigation showed the supposed weak eyes to be distinctly granular. They were not considered sufficiently bad by the parents, however, to demand treatment. That this must prevail to a considerable extent is evident from the fact that, in a large percentage of our cases, the patients do not come under observation until the disease is well advanced. The relation of catarrhal states to the question we are considering is of high interest and importance, and in a special degree to treatment. The majority of

text-books tells us that, where no discharge exists, sulphate of copper is indicated; and when present, nitrate of silver solution. Such statements, to my mind, are calculated to do considerable harm; and their adoption, of course, more so. Experience does not teach us that such advice is either sound, or based on correct principles.

There is one feature of this disease which is always perplexing, and always a source of discouragement. I allude to the frequency of relapses. What is the cause of a relapse? It is not difficult in many diseases to answer this question. But in granular lids, the individual granules of which are visible and tangible for a time, and evidently completely disappear—what is the reason of their re-appearance? It is not re-infection; for although recently cured granular conjunctivitis would leave a surface unquestionably more susceptible than one previously unaffected, still we have in many instances abundant evidence to show that a genuine relapse has to do with influences seated in the eye itself. Bacteriology is, I think, making it every day more clear, that a relapse is due to a specific trachomacoccus, already alluded to. For undoubtedly, in many cases, when all active manifestations of disease at least will have passed away, there will still remain some of these micro-organisms in an undeveloped state, embedded in the tissue. Their development may have been retarded during the period of treatment, but when this has been abandoned, they have started into fresh activity. Hence the continued watchfulness necessary after an apparent cure. The division of this disease into acute and chronic stages is not a happy one. It is much better to regard it as essentially chronic, with acute exacerbations.

The real *raison d'être* of this paper, however, has reference chiefly to treatment, and the surgical management of one of its principal complications—pannus. The limits of this short paper preclude me from dealing with other complications, which are scarcely less important. There are few diseases where hygienic conditions should form more prominent a feature, than in granular conjunctivitis. "It begins in filth, is nurtured in filth, and is propagated chiefly by the same means."* A remarkable instance of this is related by Macnamara. Writing on the same subject, he says:—"An instance of the same kind will be found in certain schools in Calcutta. The children in one of these schools were of different nationalities—natives, half-castes, and Europeans—but the buildings were situated in a most filthy part of the city, and were surrounded by open drains and every conceivable abomination, and granular conjunctivitis was never absent from among the boys; whereas in other schools of a similar nature, but situated in a healthy locality, not a single instance of the disease was to be met with." It is necessary to know the domestic life, if I may so term it, of every individual patient; and it may be affirmed that in few instances something will not be found that requires correction and advice. It is an undoubted fact, which experience almost daily confirms, that sanitary defects often defeat our best directed efforts. Whenever they can be attained, perfect hygienic conditions, suitable food, tonics, and fresh air—or, in many cases, a complete change—are always desirable, and often absolutely necessary. I was much impressed with this some years ago.

* Macnamara *op. cit.*

A brother and a sister came under my care with granular lids, which had been under careful and skilful treatment for a long period, without any tangible benefit. I treated them for a considerable time with a like result; and at last, in despair at what to do, I prevailed upon them, at great personal inconvenience to themselves, to reside in a different part of the country, and where scarcely any but constitutional treatment was adopted. On examining them some time afterwards, the disease had almost entirely disappeared.

Having seen then, that the patient's surroundings are as perfect as circumstances will permit, the next consideration is the treatment of the affected eyes. Before adopting this, it is well to ask ourselves, What do we aim at, and have we any guide to treatment? The routine method of treatment sometimes adopted in this disease would almost incline one to believe that ophthalmic therapeutics had not yet escaped from empiricism. Our aim, briefly stated, is to procure absorption of the foreign products, and the restoration of the conjunctiva to a state of health. We aim at this in various ways, which are better noticed in detail. The term "papillary" may be regarded as representative of a state requiring a particular treatment. When occurring as a sequence of a previous disease, its treatment calls for nothing special; when occurring in conjunction with follicular conjunctivitis, so as to constitute the mixed variety, its treatment will come under the remarks I am about to make. I wish to allude for a moment to a class of cases, viz., those distinctly and typically acute. In these cases an amount of inflammation may have been set up, which will be sufficient to cure the granular state without our aid. Here, non-interference may be highly desirable. I alluded before to the two divisions into which granulations naturally fell—the non-discharging and the discharging. First, in regard to the former, we have here granulations in a quiescent state, causing only, perhaps, slight conjunctival hyperæmia and discomfort in the eye, and nothing more. There are two methods of treatment available here—To set up a sufficient amount of inflammation in the eye, which will cause absorption of the granules; or to treat them by scarification, massage, and astringents. The latter method I will deal with, in conclusion, as being the plan I prefer, and nearly always practise. Sulphate of copper, either alone, or in combination with other substances, has long been a favourite in the present affection, with the object of setting up an amount of inflammatory action necessary to cause the disappearance of the granules. That it sometimes succeeds, is undeniable; but no one who has watched the time it takes to effect a cure, and its often unsatisfactory results, would be prepared to say that it is a remedy of much value. The reason of this is not far to seek. A remedy that we know will be perfectly safe, so far as the integrity of the other structures of the eye is concerned, is not of sufficient intensity, in too many instances, to accomplish the object aimed at. In a typically mixed case, the remedy would have a positive disadvantage. We might, it is true, benefit the follicular granules, but not the enlarged papillæ. To effect any improvement in them, our remedy must be purely astringent, and of a strength graduated to the needs; not an irritant, as the remedy we are dealing with undoubtedly is, in the sense we are using it. Going back to the question of the intensity of a remedy, and the desirability of its safety, it is not long since jequirity gave high promise of, in

some measure, accomplishing this desirable end; but it has not realised the expectations formed regarding it. While, at times, undoubtedly useful, it is exceedingly uncertain in its action, and doubtful in its results.

The treatment of granular lids, with acute inflammatory symptoms and a free discharge, is a problem of great complexity. Allusion has already been made to granular states without a discharge. Two factors are chiefly or solely engaged in bringing a discharge about, putting aside the question of direct infection, either a certain stage being reached by the development of the granules, or some disturbance to the general health. The resulting ophthalmia is one of the methods by which a cure takes place, but except in the so-called acute form it is hardly ever successful. Nay more, it is generally entirely abortive, and of little practical value. On the decline of the inflammatory attack, matters are often found worse than before it. The treatment of the discharging stage is essentially the treatment of the ophthalmia. Various remedies are in use for this purpose; among which, a solution of nitrate of silver, in different strengths, occupies a prominent place, so that it may stand for the whole astringent group. While clearly recognising its value in attaining a certain amount of good, it must be remembered that the objects it accomplishes are only temporary in many instances. The cure of the ophthalmia does not necessarily mean the cure of the disease. If it is true, however, as German and Italian investigators are endeavouring to prove, that the disease is parasitic, the method of treatment will no doubt be soon placed on a sounder basis. And this is what is being attempted. At the conclusion of an elaborate paper, where the subject of granular conjunctivitis is studied from a purely bacteriological point of view, and the opinion expressed that the disease is due to a specific trachomacoccus, Staderini at once applies the knowledge gained to the test of clinical experience. As might have been expected, the drug selected is corrosive sublimate. If this application should turn out a success, as the author declares it has, it will prove what often turns out to be the case, that empiricism has established the value of a remedy long before it was scientifically proved; for as far back as 1825, we find Buzzi* writing that he had used corrosive sublimate for the last twenty years. His formula was—Hydrarg. bichlor. gr. j, chloride of ammon. gr. ij, water 8 oz. This he declares to have used with the happiest results in ophthalmia and the disease under consideration. In Glasgow, Scotland, which I visited a few years since, and which was the home and field of labour of that distinguished ophthalmologist, McKenzie, I was given a prescription of his, which the donor assured me was "good for anything" in the shape of inflammation of the eye. This, strange to say, contained the same ingredients as the above, with the addition of belladonna. To enter at length into the results attained by Staderini would scarcely come within the scope of this paper. They are encouraging so far, but necessarily crude and incomplete, as first investigations generally are. He recommends, if there is a discharge, that solution of nitrate of silver may be used in addition; not necessarily however, as he treated a number of cases

* Buzzi—Ragionamento sull' oftalmia pustolare contagiosa, quoted by Staderini, "Annal di Ottalmol."

without it. This method, if the apparent facts on which it is attempted to found it are true (and I do not doubt but they are), may prove a most valuable one. I have used it in some cases, but I cannot say with much benefit. This has arisen in a great measure, I think, from the solutions being too weak, the eye being capable of bearing with advantage solutions of much greater strength than are now being used. Whatever may be the pathology of granular conjunctivitis, or whatever stage it may have reached, or under whatever conditions it is found to exist, I have derived the best and most lasting benefits from a treatment first recommended by Prof. J. R. Wolfe, of Glasgow. This consists of scarification of the lids, massage, and the employment of syrup of tannin, in the proportion of two drachms of the tannin to an ounce of simple syrup. The parts are first painted with a 4 per cent. solution of cocaine as often as may be necessary, to abolish all sensibility. To take the upper lid as an example; this is strongly everted, and the patient requested to keep the eye fixed in a downward direction. The extent to which the scarification is carried, will depend on the extent of the granular condition. Beginning at the lowest part, so that the hæmorrhage will not interfere with the view, the incisions are to be carried along the horizontal axis of the lid as closely together as possible, over every part of the seat of morbid action. When there is considerable engorgement of the tissues, a thing not at all improbable, the incisions may be further extended, although no granulations are visible. When this has been accomplished the lids are closed, and massaged by the fingers of the operator. This the patient is carefully instructed to do for the next few days. A lotion of weak boracic acid, to be used several times daily, is then ordered. After a few days' use, the syrup of tannin is substituted, and its instillation carried out according to the requirements of the case.

Now, in considering this method a little in detail, its advantages will be more apparent. In the first place, I would remark, that scarification of the lids has never occupied that high position in ophthalmic surgery which its unquestionable advantage demands. My experience of it, for some years, has been considerable; and, if its good results were more widely known, they would be more highly appreciated. In the present instance, what does it accomplish? If carefully and properly done, the contents of every granule have a chance of escaping; hypertrophied papillæ are unloaded, and their pernicious development is retarded; and finally, the conjunctival vessels participate in the depletion.

The scarification may be repeated as often as may be necessary, the same routine treatment following it, already alluded to. I may say that I have practised this method for a long time, and increased experience only confirms my belief in its efficiency. It will be observed, that when contrasted with other methods, it has some recognised advantages. It liberates the contents of the granules, that is undoubted; and if commenced at an early stage of the disease, will certainly cure it, and leave the conjunctiva intact. The action of the tannic acid on the diseased conjunctiva is rapid and effectual, and without possessing any specific properties, it is, to my mind, the best of all astringents.

The limits of this short paper will only allow me to notice one of the secondary conditions that granular conjunctivitis gives rise to, viz., pannus, and this purely from an operative point of view. The operation

of peritomy for pannus is so easy, and so simple in performance, and often so beneficial in its results, that it is surprising it is not more often resorted to. The operation itself, if we may dignify it by such a name, has, in reality, a much greater scope than would at first sight appear. It is not only that it is singularly useful in itself, but it is a powerful adjunct to other treatment. It will often be found that a pannus, rebellious to medical measures, will not be cured by peritomy, but the effect of the peritomy will be that it may, and often does, yield to treatment which was formerly used without avail. It may thus have a double function, and on that account its value is enhanced. Anæsthesia, general or local, is required for its performance, which I do in the following manner:—A cut is made with a pair of fine, blunt-pointed scissors, close to the cornea, through the conjunctiva and sub-conjunctival tissue. Into this a strabismus hook is introduced, and the structures put on the stretch. The scissors are inserted between the hook and the cornea, and follow it round, snipping the tissue close to the cornea till the circle is completed. The free conjunctiva is then seized with forceps, and a strip two and a half millimetres in width is cut off in the whole of its circumference. The only really essential part of the operation is, to see that the tissues have been quite removed from the sclerotic; in fact, that the latter is completely bare. The immediate results are extremely variable—the cornea sometimes clearing quickly, and at other times very slowly.

Such is a slight sketch of a disease and its treatment, that we are called upon daily to deal with, and which we deservedly look upon always with a feeling of doubt as to our capabilities of dealing with it. It is to be hoped that the day is not far distant when, with a better idea of its pathology and the various phases of its development, it will become more amenable to treatment.

A CASE OF SARCOMA OF THE EYELIDS.

By Odillo Maher, M.D., Ch. M.

A maiden lady named S., aged 72 years, consulted me on May 10th, 1887, on account of a very peculiar condition of her eyelids. She was a thin feeble woman, who had spent a life of toil as a needlewoman, finding it not at all times easy to obtain more than the bare necessaries of life. She stated that frequently during the last two years her eyelids and cheeks had become so swollen that she had hardly been able to see out of her eyes; and that after one of these attacks, five months previous to her consulting me, the swelling of the eyelids did not altogether disappear, and had since gradually increased in size.

Immediately under the right supra-orbital arch, and extending along its whole length, was a smooth tense semi-elastic growth composed of three lobes, which extended downwards into the eyelids between the skin and tarsal cartilage. The lower border of the growth was somewhat arched, and did not extend to the edge of the eyelid. The tumour was about the size of a pigeon's egg. Neither bruit nor thrill could be

detected. Over the position of the right lachrymal sac was a smooth hard tumour, about the size of a large pea; and in the lower eyelid, a growth consisting of two lobes similar to that in the upper eyelid, but not quite so large. It extended from the margin of the orbit almost to the edge of the lid. The skin was everywhere movable, and the growth in the upper lid was not continuous with that in the lower. The condition of the left upper and lower eyelids was similar to that of the right, but the growths were not quite so large. The patient for some months had been unable to see out of the right eye, and could only separate the eyelids of the left about a millimetre and a half. There was slight hypertrophy of the conjunctivæ. The eyeballs were normal. There was no proptosis, nor were the movements of the eyes in any way affected. The lymphatics, along the borders of the sterno-mastoids, and in front of the ears, were slightly enlarged. An aspirating needle, passed into the growths, proved them to be solid.

Five months later (October 1887), the growths had increased in size, but the lymphatics appeared normal. She was unable to open the left eyelids at all, and was practically blind. As long as she could see to get about, I was averse to operating, on account of her age and feeble condition; but, as she was now practically blind, I operated on the left eyelids, freely removing the growths. I submitted them to Dr. M'Cormick, the Demonstrator of Histology at the Sydney University, for examination. The following was his report:—"The growth consists of large rounded granular cells, about one and a half times the diameter of a red blood corpuscle, embedded in a small amount of delicately-fibrillated inter-cellular substance. It is very vascular, and the blood-vessels lie in immediate relation to the cells of the part. It has got all the histological appearances of a large round-celled sarcoma."

In April 1888, it was evident that there was a recurrence in the left eyelids, and as they were again closing, I operated on the right eyelids. In about ten days she left the Hospital, seeing well out of the eye which had been closed for sixteen months.

There is now—December 1888—recurrence in all four lids, and the left have almost closed.

REMARKS ON OPHTHALMIC WORK IN WESTERN AUSTRALIA.

By James William Hope, F.R.C.P. Ed., Fremantle, W.A.

The soil along the sea-board of the Colony, where settlement chiefly exists, is mostly sandy and in large part lime-stone. Up to parallel 29° S. the rain falls chiefly from May to October, from there north it falls during the summer, consequently there is a large part of the year in all places which is very dry. During the summer months, breezes from the land occur from sundown until about 10 a.m., then the wind comes from the sea, cooling the air, but still keeping it charged with dust; flies are very troublesome in the summer. It is to these various causes that diseases of the eye are principally due.

Ophthalmia.—This affection, although general, is of greater severity in some parts than in others, and the more serious attacks happen in the north west. Many cases there have the acuteness of purulent ophthalmia, and leave damage to sight not less than a specific form of that inflammation. These cases are locally spoken of as "blight," and are probably due to inoculation by flies and dust and dirt, conveyed by the breeze, and by the hands in wiping away perspiration. The attacks are accompanied by pain, chemosis, purulent discharge, intolerance of light, and feverishness.

A lamentable want of anxiety about the attack is often shown by parents, and the difficulty of getting medical treatment until lately caused many cases to run an unattended course, and left all the forms of sequelæ that can result from such cases, as nebula, leucoma, perforating ulcers, with fusion of anterior parts of the eye, pannus, and granular lids. In most cases, however, there have been some attempts at treatment by those attacked, usually consisting in the application of domestic or commercial eye lotions, and perhaps some golden ointment, but even these are used in such a superficial way as to be practically useless. Cases which present themselves for treatment are commonly those in which considerable damage has resulted, and are sad spectacles of ignorance, apathy and disease.

Milder attacks of ophthalmia are common throughout the Colony, and are frequently allowed to become chronic, although recourse is had to the ordinary eye lotions; yet people are in ignorance that the lids become inflamed similarly to the ocular mucous membrane, and after the eyes have apparently become cured, they are surprised that there remains a gluing of the lids at night; and in the day, lachrymation, with intolerance of light. It is only when the sight is impaired, and what is called a "scum" appears over the pupil, that assistance is sought.

The cases almost invariably turn out to be granular lids, with perhaps pannus, and some ulceration of the cornea, caused by the friction of the rough lids; the attendants or friends are surprised when the lid is turned up, and they see the red and brick-like roughness of the inner surface. Granular lids after some time usually produce in-growing eye-lashes, and one or the other or both will surely cause keratitis, ulceration of the cornea, or other damage.

It is for this affection of the lids that most patients seek relief, and numerically it forms the chief work in diseases of the eye. To treat successfully, a great amount of patience and perseverance are required by sufferer and doctor, for it often takes months to get the lid smooth, in some cases as long as eighteen months; nevertheless, my experience is that they can always be cured. I have never failed to effect a cure in the most obstinate case, if treatment be persevered with.

Treatment.—I usually employ a 10 grain sol. argent. nit., sometimes a 15 grain solution, daily, at the same time using some ointment of the yellow oxide of mercury, or insufflation of calomel if nebulous cornea be present; but if ulceration exists, eserine is the most effective drug. The great objection to the long continued use of the caustic solution is the pain it causes, and staining of sclerotic which results, if care be not taken to prevent the lotion getting on to the eye. These drawbacks may be avoided by taking care to entirely evert the upper lid, then with the second finger draw up the lower lid so that the upper rests

upon it. After applying the drug, absorb any surplus lotion by placing a small piece of good blotting-paper in contact with it, and it will be quite taken up. When the lid is released, very little pain or lachrymation will follow.

Jequirity, as an auxiliary, is worthy of a place, but I have not had the good results from its use I expected. In some cases it sets up inflammation by one application, other cases tolerate it for many times, and upon lids that have had caustic applied it is almost inert. Where I have found some good from its use, is in protracted cases; in these, after using it for a week, the re-application of the caustic solution is productive of more marked action. I consider it desirable to allow a few days to pass now and again without treatment, especially when the lid is nearly well, to see if any irritation is kept up by the applications.

Pannus, the result of granular lids, will gradually disappear as the roughness of the lids is removed, and its removal will be assisted by touching it with a mild caustic point two or three times a week.

Ulcers of Cornea occur without any assignable cause, and in the acute form cause pain, redness, lachrymation, photophobia. Treatment, consisting of the application of eserine, a blister to temple, or the artificial leech, with a pad and bandage to keep the eye quiet, and supported with the administration of opium, will cure the patient. Chronic ulcers.—Scraping the sides and base will often liven up the parts, and the same local treatment will do good.

Leucoma will also be benefited by following the same line of treatment as for chronic ulcers.

Nebula may be removed in many cases by the continued use, locally, of calomel dusted on the eye, or ungt. hydrarg. ox. flav.

Onyx, accompanying ophthalmia, will yield and disappear under the use of calomel and opium, or sulphide of calcium internally.

Hypopion, like ulcers on the cornea, occurs without any other trouble of the eye, and frequently assumes a startling severity; it is also sometimes associated with corneal ulcer. There is great pain, circum-corneal zone of redness, and often general haziness of the cornea, with a considerable collection of pus. By incising the eye, to remove the pus and relieve tension, great relief will follow. Eserine should be applied regularly, and the eye supported by a pad and bandage; a blister to the temple, or the use of the artificial leech, with the administration internally of calomel and opium, or sulphide of calcium, will generally cure an eye that looks beyond improvement.

In-growing Eyelashes of the upper lids, whether all or a few, can only be effectually cured by the removal of them all.

Corneal Prominence, so as to prevent the lids covering it, is seen as the result of thinning of anterior part of eye, with fusion of iris and cornea. Where it occurs in a man to whom time is of importance, the sight entirely lost, and who lives out of reach of medical help, I enucleate the eye; but for women, I remove successive wedge-shaped pieces, which gradually brings the eye to its normal size, after which I tattoo a pupil. The latter treatment is also effectual in cases of conical cornea.

Pterygium occurs very frequently, sometimes on one, sometimes on both eyes, growing usually from the nasal side towards the pupil, and in

time covering it, and so forming a complete barrier to vision. This condition is but rarely seen, but there are some who in the earlier days of the colony could not get treatment, and who have gone away to get the growth removed. I can merely reiterate an opinion I saw expressed in the *Australasian Medical Gazette*, namely, that it attacks the exposed part of the eye where, from the heat of the atmosphere causing dryness, coupled with dust, hypertrophy of the mucous membrane is set up, and keeps on spreading. For treatment, I find transplanting into a wound of mucous membrane, after detachment, is not satisfactory, as it leaves an uncomfortable and unsightly lump, which remains for some time. I prefer to carefully dissect off the growth and remove it, applying to the stump either iodoform or solid argent. nit.; sometimes they will recur, but the second removal is generally final. I have not heard any complaint that the removal causes any resulting scar, which interferes with the movements of the eye. When the growth is just forming, it can be made to disappear by applying the solid argent. nit. a few times.

CHOROIDITIS AND CHOROIDO-IRITIS I have seen to occur, when no cause nor history could be obtained or conjectured for the attack, but the fact that it followed upon working at a dry salt lake, where the heat and glare were intense.

CATARACT is, I think, more frequent than in cooler climates (though I have no statistics to guide me), from the number of cases that have come under my notice, considering our small population. The cause would be the heat and glare from our light sandy soil.

BUNGED EYES are common in summer, especially with children. They are due to the bite of a fly, which does not appear to be of one particular sort, but rather one that causes the local trouble by puncturing the mucous membrane with a proboscis charged with some irritant, probably some decayed animal or vegetable matter. The lips, throat and nose are sometimes "bunged." When available, and before there is much swelling, if eucalyptus oil be rubbed vigorously on the eyelid, the swelling will go down; when the swelling has taken place, olive oil instilled between eyelids will be comforting. Ophthalmia frequently follows these attacks.

ABORIGINES.

These never suffer from ophthalmia, so far as I am able to ascertain, and I have had opportunities of examining their eyes in different districts, especially Rottnest penal settlement, where men from all parts of the colony are located; they never seem to have any impairment of sight from disease. When the sight is damaged or lost, it is usually the result of accident. They have bushy eyebrows and long lashes.

THE TREATMENT OF CHRONIC CATARRH OF THE MIDDLE EAR.

By James W. Barrett, M.D., M.S., F.R.C.S. Eng.

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It is in the first instance necessary that I shall clearly indicate what I mean by Chronic Catarrh of the Middle Ear, or, as many term it, Chronic Non-suppurative Inflammation of the Middle Ear. In the great majority of cases, the appearance of the membrana tympani indicates the existence of the disease usually described by these names. It is sunken, thickened, atrophied, the bright spot is altered, or in some way the appearance deviates from that of the healthy membrane. The watch and conversation hearing is deficient, and in advanced cases the tuning fork test gives a more or less minus result. About this class of case, there can be no doubt; but in a fair number of cases the membrane looks normal, yet the watch hearing is greatly deficient, and inflation by Politzer's method improves but slightly. This class of case may be fairly grouped with the former.

It is however necessary to exclude from the category two classes of cases :—Firstly, those of Eustachian obstruction. These cases, though certainly not very numerous, seem to have passed out of the sight of some modern writers, who believe by implication that deafness cannot occur from simple obstruction of the tube uncomplicated with disease of the tympanum. Yet the explanation of a proportion of the cases of deafness met with in common cold, would appear to be the obstruction caused by catarrh of the throat and of a portion of the Eustachian tube; in these cases, the membrane appears perfectly normal.

A similar condition of things (but which is usually complicated with indrawing of the membrane, on account of the chronic nature of the disease) is met with in children who suffer from naso-pharyngeal catarrh. In both sets of cases, inflation by Politzer's method almost completely restores the hearing instantly. For such cases, it seems to me, the term "Eustachian obstruction" is justly applicable.

In other cases arising from cold, the tympanum is affected, and inflation does not at once relieve.

I have therefore excluded from consideration in this paper the cases of Eustachian obstruction. Had I included them, my percentage of complete recoveries would have been greater.

Another class of case which I have excluded occurs mostly in old people. Their watch-hearing is very defective, and the tuning-fork test gives a very negative result, and this often with signs of catarrh of the drum. One is uncertain how far the deafness is due to senile degenerations taking place in the cochlea, or in the joints between the ossicles, or how far to catarrh of the drum—which is primary, or which is secondary? I refer to these cases in my note-book as senile catarrh of the middle ear. They are also excluded from consideration, or the percentage of recoveries would have been diminished.

To give an idea of the gravity of chronic catarrh of the middle ear in this country, I append the result of the examination of fifty hopelessly deaf ears. By this, I understand cases in which, if under fifty years of age, the watch could only be heard on contact; if over that age, the conversation-hearing was reduced to nil, *i.e.*, persons incapable of following any conversation, and in all of which treatment was useless.

Of the fifty deaf ears—

25, or 50 per cent., were caused by chronic catarrh of the drum.

10, or 20 per cent., were caused by a combination of chronic catarrh and impairment of the nervous apparatus, it being uncertain which was primary and which was secondary.

1, or 2 per cent., was caused by disease of the labyrinth.

2, or 4 per cent., were congenital. Exact cause of deafness unknown.

2, or 4 per cent., were caused by intra-uterine catarrh of the middle ear.

5, or 10 per cent., were caused by acute catarrh of the middle ear.

5, or 10 per cent., were caused by chronic suppurative catarrh of the middle ear.

Probably, then, over half the cases of deafness were due to chronic catarrh of the middle ear.

Let us take, then, a typical case of chronic catarrh of the middle ear, in which there is indrawing of the membrane, possibly redness of the malleus, and some affection of the naso-pharynx. What treatment is usually adopted?

Nearly all aurists, in spite of apparent differences, really adopt a similar treatment. They attack the morbid condition of the throat by the use of gargles, the nasal douche (in spite of the accidents which have been attributed to it), or, what is more efficacious than either, alkaline and antiseptic sprays, and the use of various local applications, including the galvano-cautery. They treat the ear itself by systematic inflations, either by Politzer's method, by the catheter, or by Valsalva's method, and many inject vapours into the tympanum. Most of them, however, seem to have given up all vapours, except that of chloride of ammonium. They all seem to agree, that it is a disease which can be rarely cured, but which tends to become steadily worse as the patient grows older; but it would seem that the one circumstance in their treatment, which is essential, is this systematic inflation.

There seems no doubt that in many cases a certain amount of improvement is produced; the catarrh is got rid of, the hearing remains stationary for some time, and the patient passes away from treatment. A cold is then caught, a slight inflammation of the drum follows, and away goes the improvement in the hearing and some additional hearing as well. No treatment is adopted, and the hearing never returns to its

old condition. A patient suffering from this disease must be informed that, to a greater or lesser extent, he must place himself under the treatment of an aurist for the rest of his life. He should present himself for examination at least once in every six months whilst the disease is stationary. At such a visit the hearing should be accurately tested, and the result compared with that of the last examination. In addition, if at any time he catches cold, or notices that his hearing is manifestly worse, he should immediately seek advice.

The treatment which I have adopted has been as follows :—

(1) The treatment of the catarrh of the pharynx which is often present. I usually inquire carefully into the habits of the individual, and endeavour to obviate the liability to catarrh from which so many people who follow sedentary occupations suffer. Errors of digestion play a part in its production, and especially in women should the excessive tea-drinking be checked. Regular bathing and open air exercise are recommended, and patients are cautioned against two errors into which people are very apt to fall in this country—that of over clothing and of under clothing. This latter piece of advice is especially necessary, on account of the extraordinary variations of temperature in Melbourne. Locally, I use saline douches, sprays, and other applications (including the galvano-cautery) in the treatment of the naso-pharynx.

(2) With regard to the ear itself, I act on the following principles :—Redness of the handle of the malleus indicates active change (*vide* Paper in this volume) in the middle ear, and calls for blistering, protection from cold air, and very careful Politzerisation.

In nearly all cases in which the affection is not sub-acute or acute, Politzerisation seems to be indicated, and it is my custom to practise it, when called for, twice or three times a week for five or six weeks. In the intervals between the visits, the patients are instructed to practise the method of Valsalva from two to four times a day, and massage of the ears for one minute a day. Of late, I have been adopting the method of alternate inflation and exhaustion by the Ward-Cousens apparatus in place of the Politzer method, and with rather better results. I do not now use the vapour of chloride of ammonium, because of the difficulty in getting patients to use the apparatus. The whole of the local treatment may be regarded as having for its object the preservation of the mobility of the ossicles and membrane, and to obviate the consequences of adhesions and air exhaustion. It seems to be partly analagous to the effect of passive motion on a chronic inflammation of a joint.

It has never fallen to my lot to see any injurious consequences follow the use of the nasal douche, the Politzer or Valsalva methods employed in the manner indicated.

Subjoined is a synopsis of a tabular statement of the cases of forty-eight patients treated, and about whom I have taken careful notes. The table (not given here on account of pressure of space) shows the age of the patients, the duration of time which they believed they had suffered before consulting me, the distance at which they could hear the watch before treatment was begun, the duration of treatment, and

the distance at which they could hear the watch when treatment was discontinued. The figures indicate a less favourable result than that which should have been obtained, since many of the patients discontinued treatment before I wished them to.

Any one who can hear the watch I employ at ten inches can hear conversation fairly well. People aged 25 can hear it at about one hundred inches distant; from one hundred to ten inches I regard as the range of their surplus hearing. They do not usually complain till the hearing is less than ten inches; then they cannot follow conversation, and they seek advice. The time occupied in this reduction is usually years, and it is this loss of time which makes the treatment of this disease so unsatisfactory. Those who could hear the watch at a distance of more than fifteen or sixteen inches are reported as cured.

Analysis of the table shows that of the ninety-one ears (forty-eight cases)—

10, or 11 per cent. were cured.
27, or 30 per cent. were absolutely unimproved.
54, or 60 per cent. were improved.

Taking the first thirty-seven cases, those in which the treatment was usually continued for a fair length of time, of the seventy-two ears treated—

8, or 11 per cent. were cured.
23, or 32 per cent. were absolutely unimproved.
41, or 57 per cent. were improved.

Taking the first twenty-three cases, that is all those under 25 years of age, we find that of the forty-six ears treated—

6, or 13 per cent. were cured.
13, or 29 per cent. were absolutely unimproved; whilst
27, or 58 per cent. were improved.

Taking the 24th to the 37th cases, that is the cases between 25 and 57 years of age, we find that of the twenty-six ears treated—

2, or 8 per cent. were cured.
10, or 35 per cent. were absolutely unimproved; whilst
14, or 53 per cent. were improved.

From these tables, it seems that the number of cases of recovery is somewhat greater, and the number of unimproved cases is somewhat smaller, in those under 25 years of age, than in those over 25 years of age. Where the membrane is much sunken, where the patient is young, or where there is redness of the handle of the malleus, considerable improvement may usually be expected as a result of treatment. Where the membrane is not sunken, but is pale or opaque, where the disease is long-standing, and the patient advanced in years, improvement is usually slight; the disease is stationary, and we have to deal, not with an active disease, but with the consequences of former disease. Yet in a fair number of cases, it seems impossible to even conjecture whether improvement can be effected or not. Until some better method is devised for obtaining information as to the condition of the interior of the tympanum, the business of the aurist will continue to be as relatively inexact as it is at present.

Table (Roosa) showing the Results of Treatment of Chronic Non-suppurative Inflammation of the Middle Ear:—

Reporter.	No. of Cases.	Cured.	Improved.	Unimproved.	Unknown.
Spencer* .. (St. Louis)	56	6=16¾ per cent. of those actually treated	18=50 per cent.	10=27 per cent.	20
Schwartz † .. (Halle)	230	30=20 per cent.	94=60 per cent.	30=20 per cent.	75
Gruber ‡ .. (Vienna)	187	38=32 per cent.	61=60 per cent.	9=9 per cent.	84
Roosa § .. (New York)	514	23=4½ per cent.	160=31 per cent.	171=34 per cent.	159
Barrett .. (Melbourne)	95 cases in all 48 actually treated	10=11 per cent. of the 91 ears (48 cases) treated	54=62 per cent. of the 91 ears (48 cases) treated	27=30 per cent. of the 91 ears (48 cases) treated	47 cases

* Reprint from *St. Louis Medical Journal.*

† Archiv. für Ohrenheilkunde, bd. 1, v. passim.

‡ Monatschrift für Ohrenheilkunde, bd. 1, iv. passim.

§ "On Diseases of the Ear," Lewis, London, 1879.

Dr. Iredell (Melbourne) said that tests for hearing were unsatisfactory, and the watch test was no exception to the rule; still, it afforded some indication of the hearing power. In cases of chronic catarrh, where no active change was going on, he had found cases usually became worse under any circumstances, perhaps more rapidly when treated. He objected to the Valsalva method. It was more powerful than the Politzer method, and liable to produce flaccidity of the membrane. He had never seen any harm result from the use of the nasal douche. He agreed with Dr. Barrett, that where redness of the malleus existed—an active condition—some improvement can usually be effected. This redness can rapidly be removed by instilling vapour of chloroform into the drum. He thought that, in old cases, the nervous apparatus is affected secondarily.

Dr. T. K. Hamilton (South Australia) said that, in many old sclerosed cases, passive motion was useful. He used hypodermic injections of pilocarpine in cases of labyrinthine disease, and also in chronic catarrh; it tended to produce absorption. He did not use the nasal douche, but preferred sprays in the treatment of the nasopharynx. He believed that the treatment by multiple incision of the membrane was hopeful in some cases. It was possible also, that something might be done in the future by the local application of electricity to the pharynx and to the Eustachian orifices. He objected to the use of the Valsalva method, because of the congestion produced by the expiratory effort.

Dr. Brady (Sydney) had found great benefit in the treatment of the pharynx, by removing the hypertrophied tissue with the cutting forceps.

NOTES ON A CASE OF OPTIC NEURITIS, FOLLOWING EXPOSURE TO HEAT.

By H. Lindo Ferguson, F.R.C.S.I.

Lecturer on Ophthalmology in the Otago University.

Leber, in his article in "Graefe and Saemisch's Handbuch," mentions in half a dozen words that optic neuritis may follow sunstroke; and Professor Williams, of Harvard University, in his book on "Diseases of the Eye," says:—"Insolation of the head may cause partial amaurosis, the prognosis depending on the degree in which the central nervous organs are affected, and the recovery being slow." Dr. Wood, in "Pepper's System of Medicine," refers to a case of chronic meningitis following sunstroke, with diplopia and some blurring of the optic discs, but gives no complete details as to vision or field. With these three exceptions, I have failed to find any reference to the condition in such works on Ophthalmology as I have at my command; and, as the condition is not referred to in the indexes to the sixteen volumes of "Knapp's Archives," which give a very complete periscope of ophthalmic literature from 1869 up to the present time, I may conclude that optic neuritis, as a result of exposure to heat, very rarely comes under the notice of ophthalmic surgeons.

The only published case I have come across is quoted in the *British Medical Journal*, July 7, 1888, from the *New York Medical Record*. Dr. Tuttle of Jefferson was the sufferer, and reports that in June 1863 he had sunstroke, and was quite blind till the third day. Vision slowly improved, but the fields of vision were so much contracted, that he felt as if he were looking through two gimlet holes. Vision, twenty-five years later, is still very imperfect, and the fields are much contracted, with complete night blindness. The case is unfortunately very incomplete, as there is no reference to the ophthalmoscopic appearances; and though the present condition of the vision is consistent with the assumption that there is atrophy of the optic nerves, the absence of examination of the fundus in the early part of the case leaves us in doubt as to whether the visual troubles were the effect of injury to the visual centres, or of optic neuritis, secondary to the cerebral lesion.

I have seen two cases of optic nerve lesion—one of old standing, in which the patient attributed his condition to sunstroke, but in which the history was very imperfect; and one recent case, the notes of which I propose to place before you.

In the first case, a seaman of over middle age applied to me at the out-patient room of the Richmond Hospital, Dublin, during the summer of 1880. He stated that two and a half years previously he was employed in a trading schooner in the South Seas, and exposed to very intense heat. He suffered from very severe headache, and lay on deck at night for coolness. On the third day his sight failed, which he attributed to lying on deck in the moonlight, though he blamed the insolation for causing him to do so. At the end of his trip he was admitted blind into the Dunedin Hospital, where he was treated for many weeks, during which he still suffered excruciating pains in the head. He had been discharged, free from pain, but with bare

perception of light, and had somehow found his way home to Dublin. He had intense post-neuritic atrophy of both optic nerves, and bare perception of light in the left eye. Treatment was unavailing. Only having seen ophthalmic work in temperate climates, I inquired as to other likely causes without eliciting any, and finally passed the case over as puzzling, but hopeless. Unfortunately, I have no record of his name, so that I have been unable to trace him in the hospital records here. The history of the case makes the suggestion, that the neuritis was due to insolation, at all events possible; but though he denied ever having had syphilis, the possibility of a specific cause in a seafaring man is too considerable for the case to be accepted as a wholly satisfactory one.

The second case is a recent one, and all other causes were carefully excluded, or have been excluded by the subsequent history:—

Miss K. M., aged 5, living in Canterbury, was brought to the study on March 11th, 1884, with the following history:—She was in perfectly good health till the third day of a hot wind, thirteen days before her visit. The nursery was very hot, and she was constantly running in and out through the verandah into the garden in the heat. On this day she complained of a pain behind the right ear, which lasted three days. On the fourth day her sight was noticed to be defective, and gradually failed for four days, since when it had been stationary. She had had no treatment except a vermifuge. She was the eldest of four healthy children, and the family history was good. When seen, V Oc. Dex. = fingers at 0·5 millimetres; Oc. Sin. = mot. hand. With the ophthalmoscope the right disc was seen to be blurred, the retinal veins large and the arteries small and indistinct. The left disc was swollen on its nasal side.

A diagnosis was made of descending optic neuritis, secondary to meningitis, due to exposure to heat. A fairly favourable prognosis was given, and she was put on the iodide and bromide of potassium, and also given two grain doses of pulv. hyd. c̄. cret. thrice daily. She was freely heurteloupeed on both temples, and kept in the dark for the subsequent twenty-four hours.

On March 13.—V = mot. hand Oc. Utr., and the discs were more swollen. She was ordered inunctions of ung. hyd. gr. xv thrice daily, and given pil. col. co. and pil. rhei. co. āā. gr. v.

On March 14.—V = F 0·5 millimetres Oc. Dex., mot. hand Oc. Sin., and she had numbness and loss of power in the right hand. The inunctions were pushed.

The following day she had more power over the right hand, but had had spasmodic twitchings of her throat during sleep.

On March 16.—V Oc. Dex. = F 1·5 millimetres, Oc. Sin. mot. hand. Had had severe twitchings and jumping of legs during sleep. She was ordered a draught of bromide of potassium and chloral if twitchings should occur during the night.

During the three following days the swelling of the discs increased, in spite of the renewed use of the artificial leech. She was very restless and delirious at night, but would sleep heavily from 3 a.m. till 1 p.m., or later. In the restless stages, she rolled her head continually from side to side.

On March 21 she was looking well, and the symptoms of nerve irritation were less. Her gums were not touched, though she was having ʒj of ung. hyd. rubbed in daily.

On March 23.—V Oc. Dex. had risen to F 3·5 millimetres; but on the 25th, she was complaining of pain in the right mastoid, and had slept from 3 a.m. till 5 p.m. The vision had gone down to F 2·5 millimetres Oc. Dex. Oc. Sin. V = P light.

March 26.—There was more mastoid pain, and V had fallen to F 1 millimetre Oc. Dex. The left disc was much paler and sharper in outline than before; temp. normal. Ordered half a minim ol. crotonis in ʒij ol. ricini, and gr. xx of bromide of potassium every four hours.

The following day she had been much purged by the croton oil, and had slept very little, but the vision was a shade better. Dr. Batchelor saw the child later in the day with me, with reference to the nature of the cerebral lesion. He concurred in the existence of meningitis of the base, and in the treatment, which was continued.

After two quiet nights, V on the 29th was F 1·5 millimetres Oc. Dex., which was improved to F 2 millimetres by the use of a continuous current for three minutes. The discs looked white, and the arteries very small. The inunctions were stopped.

By April 2, V had risen to F 3 millimetres Oc. Dex., F. 1·25 millimetres Oc. Sin.; but on the 4th, there was fresh occipital headache, and V fell to F 1 millimetre Oc. Utr.

She had no severe headache later than the night of the 5th, and from the 7th the vision began to improve steadily. The constant current was used at each visit to the study, and always produced some improvement, which was generally retained.

On the 11th, she was ordered Kirby's phosphorus, quinine and nux vomica pills, her vision then being F 2 millimetres Oc. Dex., F 1·5 millimetres Oc. Sin. Both discs very white.

On the 20th, V was $\frac{6}{60}$ Oc. Dex. and F 2 millimetres Oc. Sin.; and on May 7th, V was $\frac{6}{36}$, and letters J 1 better, and F 5·5 millimetres Oc. Sin. She was then allowed to return home, with directions to continue the phosphorus pills.

She made steady progress, and on October 31 V was $\frac{6}{12}$ Oc. Dex., and $\frac{6}{12}$ letters Oc. Sin. and Prox. J 1 Oc. Utr. easily. The discs were white and sharply defined, but the arteries were larger than before. All treatment was then stopped, but she was ordered to return to the pills from time to time whenever she did not seem thoroughly strong and well.

In December 1887, V was $\frac{6}{6}$ letters Oc. Dex., $\frac{6}{9}$ letters Oc. Sin., and the nerves remained about the same as when last seen.

On October 12, 1888, V was $\frac{6}{6}$ letters Oc. Dex., $\frac{6}{6}$ Oc. Sin., and Prox. J 1 Oc. Utr. The fields of vision were normal, and the only anomaly of function I could detect was, that she seemed slow to recognise retinal impressions. Both discs were very sharp and white, and the arteries small. Her general health is perfect, and both her physical and mental development are above the average for her age.

The fact of the child's physical and mental health being good four and a half years after the attack, and the absence of any cerebral symptoms in the mean time, except an occasional headache on a hot-wind day, practically put the existence of a cerebral tumour out of the

question; and of the family history being good, except that the mother is neurotic, there is absolutely no doubt. The only explanation of the neuritis that occurs to me is the diagnosis I made in March 1884, and that insolation is not recognised as a cause by the majority of authors does not preclude the possibility of its producing this effect.

Most authors who write on ophthalmic subjects live and practise in temperate climates; but insolation is fairly common in many of the large American centres, and occurs sufficiently often in London and the large continental cities to make it likely that, if optic neuritis were a frequent complication, the fact would have been recorded. Since treating this case, I have kept a special watch on the reports of the Madras Branch of the British Medical Association, to see if Brigade-Surgeon Sibthorpe, or any of his colleagues, have noticed similar instances, but without success. Possibly, the natives are not very susceptible to heat, and the Europeans take sufficient precautions against it.

It appears to me that the most likely soil for the observation of the conditions likely to cause ocular troubles in connection with insolation is Australia, where intense heat is far more common and universal than either here or at home, and where the tendency in the rising generation to develop the neurotic strain, common alike to America and the colonies, has had a longer time to show itself than in New Zealand.

It is in the hope that these notes may call forth similar observations, if any exist, that I have ventured to bring them forward.

A CASE OF CEREBELLAR ABSCESS, UNSUCCESSFULLY TREATED BY TREPHINING.

By H. Lindo Ferguson, F.R.C.S.I.

Ophthalmic and Aural Surgeon to the Dunedin Hospital. Lecturer on Ophthalmology in the University of Otago.

E. C., aged 17, presented himself on July 21, 1888, with the following history:—He had suffered from otorrhœa from the right ear, of nine years' standing, following scarlatina. The discharge ceased at intervals, to give way to mastoid pain and tenderness. He had been in the Dunedin Hospital three years previously under my care for mastoiditis, but recovered after a large Wilde's incision had been made. He had not since had any severe attack until the one for which he sought advice. The discharge had ceased four days previously, and he had since suffered from severe headache and mastoid pain.

The membrana tympani was gone, and the mucous membrane of the middle ear was much swollen and glazed, but showed hardly any discharge. It was excessively tender, and he could hardly bear it to be touched with cotton wool. There was great pain and tenderness in the mastoid region, which showed the scar of the old incision. Syringing the ear caused considerable giddiness, so he was given no lotion, but

was ordered constant poultices over the ear and mastoid, and told to go into the hospital at once. At this time the boy was looking very ill, and he had been shivering. His tongue was thickly furred, and the bowels were confined, but his temperature was normal, and his pulse about 80.

For some reason, he did not go into the hospital till the 23rd, two days later, when his condition was much about the same. He was given a purgative, and put on the iodide and bromide of potassium, and the poultices were continued, a slight discharge from the ear having been established. The mastoid tenderness was less, and there was no puffiness about the ear.

On the morning of the 25th, his temperature ran up to 103°, without marked rigor, falling in the evening to 100°, but he expressed himself as feeling better and in less pain. The following day his temperature rose to 101°, falling to 100° after he had been given gr. iv. of calomel with gr. v. of sod. bicarb., and it never rose above this point till the end of the case. The constipation continued, and on the 28th, he was given a saline purgative, which seemed to make his head more comfortable. He did not complain much of pain, but moved his head slowly as if motion hurt him. His general condition otherwise seemed better. There was no loss of power on the left side, and he answered intelligently when spoken to.

On the 29th, he had occasional attacks of drowsiness, and at 3 a.m. on the morning of the 30th, he woke with severe mastoid pain, for which Dr. Fleming, the House Surgeon, was called and gave gr. v. of calomel by the mouth. The pain shortly afterwards ceased, but he became comatose, and was only capable of being partially roused at 9 a.m. This slight improvement at 9 o'clock coincided with the establishment of a free fœtid discharge from the ear, and his temperature was then only 99°. At 11.30, the free fœtid discharge from the ear continued, and he was lying in a state of semi-coma. Both pupils were contracted, and both optic discs were intensely red and congested. He groaned slightly on the head being moved; but from his condition, no loss of power on the left side could be detected, to give any clue to the seat of the abscess. His respiration was 18, and stertorous. Pulse 76, and good.

At a consultation of the Staff two hours later, it was thought that there was less resistance to passive movement on the left side than on the right; but his condition of coma was deeper, and he no longer groaned when the head was moved. The discharge from the ear had lessened considerably. In the absence of any paralytic symptoms, the motor area could be excluded as the seat of the lesion; and it was decided that the best chance of reaching the abscess lay in opening the temporo-sphenoidal lobe.

While he was being chloroformed, a gush of nearly half an ounce of fearfully fœtid pus came from the ear, and the meatus was immediately plugged, lest by the escape of the matter the abscess cavity should be missed, and the chance of establishing satisfactory drainage lost. A spot three-quarters of an inch above, and one and a half inches behind the axis of the meatus, which had been the most tender spot on percussion, was selected as the centre of the opening. A curved horizontal incision, with its convexity downwards, was made below this

spot down to the bone, and a vertical incision meeting the first one at its centre. The periosteum was raised with the flaps, showing the bone below healthy, and an inch disc of bone was removed at the chosen spot. Some little difficulty was experienced from the lower edge of the trephine cutting through the thick bone at the head of the mastoid, so that the incision down to the dura mater being complete elsewhere, the disc was still held in place. When it was elevated, the dura mater was seen to be light green in colour, and thickly infiltrated with matter; but when it was divided, the brain substance below seemed perfectly healthy. As a few drops of matter welled up from the anterior lower part of the opening, between the dura mater and the bone, a three-quarter inch disc was removed farther forward, the pin of the trephine being placed about an eighth of an inch in front of the edge of the first opening.

When this was removed, the dura mater underneath was found to be healthy, and the purulent meningitis was found at the post-mortem to be confined to the area exposed by the first opening. A needle was then passed into the brain in six or seven directions up to a depth of three inches without finding matter. A probe passed downwards slid in along the surface of the tentorium, and it was not considered wise to pass a needle down for fear of entering the lateral sinus. Further attempts were abandoned. A drainage tube was left to the dura mater, and the wound was closed. After the operation, his pulse was 76 and his respiration 17 and irregular, but not so stertorous as early in the day. At 5 p.m. his pulse was 100 and his respirations were 22, shallower, but more regular. His temperature had fallen to 98°, and he answered rationally when spoken to, and recognised his mother.

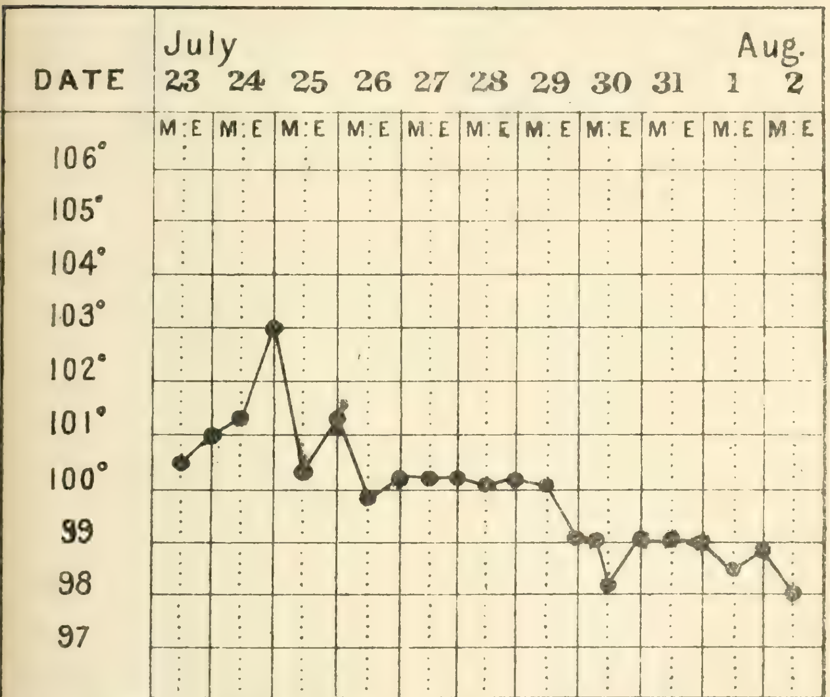
The following day his condition was about the same, but on August 1 he roused up and asked for beef-tea. This improvement coincided with fresh discharge from the ear. On the 2nd, he relapsed into a condition of deep coma, and died during the night.

At the post-mortem examination made next day, a patch of purulent meningitis was found, almost exactly corresponding in extent with the first disc of bone removed. The wound had healed by first intention, except where the drainage tube projected at the lower angle. An abscess, the size of a small egg, occupied the front of the right lobe of the cerebellum, and communicated with the ear by the passage seen in the specimen. It is difficult, looking at the specimen, to understand how the boy escaped pyæmia, as the channel through the bone opens directly into the groove for the lateral sinus, and the passage by which the matter escaped lifted the walls of the sinus and passed below it. Had any attempt been made to pass a needle through the tentorium into the cerebellum, it would have pierced the sinus, and resulted in emptying the abscess into the vessel. There is no need for me to do more than refer to the specimen, which speaks for itself; but I regret that, as I was not present when it was removed, only a small portion of the trephine opening was preserved.

The temperature chart is of interest in connection with Dr. Bristowe's observation that, though the temperature is usually normal in cerebral abscess, there is generally fever when the lateral sinus is involved. Though this remark has been made with reference to cerebral abscess, I am not aware of any series of observations as to the temperature in

A CASE OF CEREBELLAR ABSCESS UNSUCCESSFULLY TREATED BY TREPHINING

By H. Lindo Ferguson, F.R.C.S.I.



DATE	July 23	24	25	26	27	28	29	30	31	Aug. 1	2
PULSE M / E		76	80 / 76	68 / 76	74	72	72	76 / 100	80 / 84	76 / 82	
RESPN. M / E								17 / 22	20 / 20	20 / 21	
SKIN	*Dry all through*										
TONGUE	*Thickly furred all through*										
BOWELS	*Only acted after Medicines noted in case*										
URINE	*High coloured Lithates*										

cerebellar abscess ; and from the close relations of the cerebellum and lateral sinus, it must always be a matter of difficulty to say whether the high temperature is due to cerebellar lesion, or to implication of the sinus.

The case only throws a negative light on cerebral surgery, by showing once more that there are no localising symptoms in cerebellar abscess ; and corroborating the observations of others, that the seat of most intense pain is not a reliable guide to the situation of the lesion. One very interesting observation was made on section of the brain—that the needle punctures had caused no irritation and left no trace, which encourages exploration in doubtful cases. The literature on the subject of cerebral surgery is as yet so limited, that even an unsuccessful case is of interest, and I have therefore felt emboldened to bring this one before the Congress.

A CASE OF CONGENITAL CYST OF THE LOWER EYELID, WITH MICROPHTHALMOS.

By W. Odillo Maher, M.D., Ch. M.

In June 1887, an infant was brought to me by its mother, who was anxious to ascertain whether the child's left eye had been "burst at birth." My attention was at once drawn to a smooth tense tumour in the left lower lid, about the size of a cherry. The skin over it was of a bluish tinge, and fairly movable. The eyelids were well developed, but the upper one sank inwards as though the eyeball was absent. The left half of the frontal bone was ill-developed. On separating the eyelids, a cavity lined with conjunctiva came into view, but nothing resembling an eyeball could be seen. As the child had an imperforate anus, and evidently could not live long, I refrained from administering an anæsthetic to facilitate the examination.

A few days later, Dr. Crago (to whom I am indebted for the opportunity of examining this case) sent me word the child was dead, and I was then able to make a thorough examination. On separating the eyelids, the cyst in the lower lid was seen to extend along the floor of the orbit. At the bottom of the cavity, which was lined with conjunctiva, was seen the small cornea (about a millimetre in diameter) of a rudimentary eye. The rudimentary eye, which I incised, was about the size of a large pea. The cyst contained about a drachm of thin yellowish-green fluid. There was a coloboma of the iris of the other eye.

A CASE OF GLAUCOMA, IN WHICH IRIDECTOMY APPEARED TO BE HURTFUL.

By James T. Rudall, F.R.C.S.

If the object of this communication were to discuss, ever so briefly, the real value of iridectomy in glaucoma, while I should by no means claim for the operation a universal success, it would be possible to refer to cases in my own practice where it has produced beneficial results, sometimes, indeed, to a degree unlooked for, if not almost incredible. And probably, thus far, my experience is not widely different from that of many other practitioners in this department of surgery. For, although Von Graefe's brilliant discovery was first met, in some quarters, by strenuous opposition, time has shown that iridectomy in glaucoma is one of the great advances in modern ophthalmic practice. But, this being admitted, it by no means follows that we need no further study of glaucoma and its management; and since it is possible sometimes to learn from failure as well as from success, I now desire briefly to record the following case, which caused me unusual regret and disappointment:—

A single woman, forty years of age, was sent by a medical friend for my advice on March 16, 1888. According to her statement, about two years ago she lost the sight of the left eye, which was now found to be without perception of light; to have the pupil so much dilated that the iris was a mere atrophied ring; to have staphylomatous bulgings of the sclera at the outer margin of the ciliary zone in the lower and outer quadrant, and likewise to be affected with secondary cataract. This eye also had T + 2. She said further, that three days ago the sight of the right eye became misty, she had pain in the eye and orbital circumference, and she saw rainbow colours around the candle flame. On examination there was little, if any, conjunctival or scleral injection; the pupil was not dilated, but the iris was thrust forwards, and there was increased tension—T + 1. Vision was nearly $\frac{20}{40}$, and some letters of 2 Snellen could be made out at 12 inches. The fundus could not be illuminated by the ophthalmoscope. Eserine drops (gr. iij to ℥j) were ordered to be instilled four times in the twenty-four hours.

March 18.—Vision was reduced to $\frac{20}{100}$ T + 2. The anterior chamber was almost obliterated, the iris lying nearly in contact with the cornea. I now considered that, having regard to the previous loss of sight in the left eye, and the rapidly failing vision in the one (right) newly attacked, iridectomy on the latter was urgently demanded.

The patient being in poor circumstances, I took her into the hospital, and performed an upward iridectomy on March 20. As it would not have been possible to use the ordinary lance knife without great risk of wounding both iris and lens, I employed in the operation a very narrow knife (De Wecker's), and with it I was able to make a satisfactory, though slow, upward section of the cornea. In other respects also, the completion of the operation answered my expectations; there was, however, some bleeding from the cut iris. She was for a time relieved from pain, but when we opened the eye two days afterwards, vision was found to be quite abolished. Soon, the

tension, which had been temporarily reduced by the iridectomy, became as high as before, and pain also returned. Subsequently the scar became cystoid, and although sight was irrecoverably lost, I performed a second iridectomy (downwards), in the hope of relieving pain and tension. This proceeding had very little immediate effect, and she had to remain under supervision for a considerable period. I confess myself unable to explain satisfactorily why in this instance the operation of iridectomy proved futile, if not even injurious; for it seemed improbable that the disease, left to itself, would cause absolute loss of perception of light in so short a time as four or five days.

DEATH FROM SEPTIC MENINGITIS, FOLLOWING EXCISION OF A SUPPURATING EYEBALL.

By James T. Rudall, F.R.C.S.

In more than twenty years of my practice, one case only had been fatal after excision of the eyeball; and as was proved both by the symptoms and by a post-mortem examination, death in that instance had nothing to do with the eye affection, or the enucleation of the globe which was performed for it. The orbit and the cranial contents were found to be sound and healthy. The cause of death was extensive suppuration and sloughing of the connective tissue outside the lower part of the bowels, produced by the injection of a turpentine enema.

The case was published at the time in the *Australian Medical Journal*, and the only supplementary statement I have here to make is that, whereas when it was reported I was inclined to hold the nurse blameless, information subsequently obtained has led me to attribute the death to gross carelessness in the administration of the enema.

On August 21, 1886, a medical gentleman of my acquaintance requested me to meet him in consultation on Mr. ———, living about twenty-five miles from Melbourne. The patient was a fairly healthy man between 30 and 40 years of age, the sight of whose left eye had been destroyed many years before by an injury. A few weeks before my visit, the eye had become much inflamed, and the ordinary remedies were found quite inefficient. When we met, the patient was suffering agonising pain, the lids were much swollen, the eyeball protruded, and there was very severe pan-ophthalmitis. It seemed clear that we must either enucleate, or make a free incision through the front of the eye. In the hope of at once ridding the patient of all diseased structures, we chose enucleation, and the patient having been chloroformed by my colleague in the case, I then and there performed that operation.

In respect to this, it is only needful to mention that a spring speculum could not be used, in consequence of swelling of the lids and protrusion of the globe; and that the bleeding was, as would be expected, very free. The patient was much relieved by the operation, passed a good night, and continued to do well the next day.

On the second night, he did not get much sleep, but his medical attendant, on visiting him, saw no cause for apprehension.

On the fourth day, I was again telegraphed for. Before entering his bedroom we heard him calling out loudly, and declaring that he was dying; after a little remonstrance and assurance from us, he became calm and rational. He complained of pain in the top of his head, and said he felt sure that he would not recover. The tongue was clean, the pulse 80, respirations 18 to the minute, the temperature 101·2°. The orbit was healthy, so far as inspection and examination with the finger could show. On enquiry, we were informed that he had some shivering last night. Although strong atropine drops had been put into the right eye previous to my visit, examination with the ophthalmoscope was not easy, owing to the restless state of the patient. I obtained a view of the fundus in the erect image, and found the disc rosy but well defined, and showing the black margin of the choroid at its outer edge. As I was subsequently informed, the symptoms of meningitis became unmistakable, and he died comatose three days after. No post-mortem examination could be obtained.

The next case of pan-ophthalmitis, for which I had to operate, occurred in an adult inmate of the Victorian Asylum and School for the Blind. It was severe, though not so bad as the foregoing. I performed evisceration, and the patient did well, but convalescence was much slower than is usual after enucleation.

Another patient with pan-ophthalmitis was a youth of seventeen years of age. His case was less acute, and I enucleated with a good result. With present knowledge and experience, I am inclined, in a long standing or very severe case of pan-ophthalmitis, to prefer evisceration, rather than to enucleate the eyeball.

Dr. Symons (South Australia) had hitherto never hesitated to excise a suppurating eyeball. In the future, however, he felt that the propriety of excision in such cases must be considered.

Dr. Barrett (Melbourne) related two fatal cases of excision of suppurating globes; both occurred at Moorfields. In a case in his own practice of perforating wound of the cornea and lens, followed by operation for the removal of the lens, the temperature suddenly rose to 102°; there was severe headache; the symptoms increasing for forty-eight hours, the eye was excised. It was not purulent, simply intensely inflamed. The excision did not relieve symptoms, the temperature continued to rise, the headache increased, and the lids and tissues of the orbit swelled enormously, and for seventy-two hours after excision the condition of the patient was critical. Ultimately, he made a good recovery.

Dr. T. K. Hamilton (South Australia) said that, of the two operations before the profession for the treatment of suppurating eyes —enucleation and evisceration—he preferred the latter.

THE OCULAR MANIFESTATIONS OF LATE HEREDITARY SYPHILIS.

By G. Adlington Syme, M.S., M.B. Melb., F.R.C.S. Eng.

Surgeon to Out-patients, Melbourne Hospital.

Notwithstanding the many exhaustive researches on this subject, one or two questions in connection with it are still unsettled, and it may be of some interest to put on record the following observations:—

I find I have notes of 120 cases of various eye affections, mostly keratitis, presumably due to hereditary syphilis; but as some of these are a little doubtful, I have pruned them down, so to speak, leaving about 100, the specific origin of which, I think, is unquestionably revealed by other conditions, such as the state of the teeth, the nose and the ears, the history of the period of infancy, or, of most reliance, the history of the rest of the family, and the signs or history of syphilis in the parents. The fact that, in considering the eye affections of hereditary syphilis, one has had to reject about twenty cases of affections, which most writers consider in themselves absolute evidence of specific taint, must not be taken to imply a doubt as to the correctness of such a view. Notwithstanding the opinion of many French authorities (well expressed by Fournier), that interstitial keratitis is a trophic lesion which may be due to various causes, syphilis being the cause generally, but not exclusively, and notwithstanding the apparent reasonableness of this view, I think myself that Hutchinson's opinion, that interstitial keratitis is always due to syphilis, is more correct; it is also more generally accepted. Keratitis need not always be due to an inherited taint, however, and some of the cases referred to have been rejected, because there was a probability that they were due to acquired syphilis. Assuming then, that all these 100 odd cases are due to hereditary syphilis, what tissues of the eye appear to be most affected by this disease?

Here we at once enter debateable ground. Most authorities say the cornea is the structure by far the most frequently affected, and that interstitial keratitis is *par excellence* the eye lesion of hereditary syphilis. Trousseau maintains that choroiditis is the most frequent condition; but that keratitis always comes under observation, while choroiditis does not. Unfortunately, my cases do not directly help the solution of this question, because, being collected from the oculist's standpoint, almost all the cases came under observation with keratitis; but still they reveal this fact, that choroiditis is generally to be found in an eye affected by hereditary syphilis.

Out of the whole 120 cases, in only 54 was it possible to carefully examine the fundus, either by examining one eye before the keratitis was present, or by examining after the keratitis had recovered. This examination is always difficult. The cornea is seldom perfectly clear; oftentimes the pupil is bound down; and as the choroiditis is almost always situated at the extreme periphery, it is easily overlooked. Notwithstanding these difficulties, evidences of choroiditis were found in 47 out of these 54 cases.

Out of 102 cases in which the fact was noted, iritis was either present, or had left its traces, in 44. Keratitis, iritis, and choroiditis were all

three found in only 17. It must be remembered, however, that most of the cases where choroiditis was found were examined after the keratitis had passed off, and where the iritis, if it had been present, would have passed off also, and especially where the case is early treated, without leaving any traces by which its presence could be detected at this time. The cases where iritis was seen, on the other hand, were in the early stages, when it was impossible to detect choroiditis.

So far as these observations go, therefore, they seem to me to tend to justify the conclusion, that the cornea, iris, and choroid are all affected in the majority of cases (all being undoubted cases of hereditary syphilis).

The next question to be settled is—Are these structures affected simultaneously, or if not, in what order are they affected? I think the general opinion is that they are all affected simultaneously. Others hold that the cornea is first affected, then the iris, and that from this (especially if neglected) the affection spreads back, causing cyclitis and choroiditis.

Another view is that the choroid is first attacked, and the affection spreads forwards some time after the first choroidal changes. This last view may be elaborated as follows:—Syphilis is due to microbes. In hereditary syphilis these are conveyed to the offspring, and excite the so-called secondary phenomena of infancy. Among these, iritis is admittedly not uncommon; choroiditis also occurs, but is not observed. The tissues gradually get the better of the microbes, and the affection subsides. But the microbes are not utterly destroyed; they are only held in check, and lie dormant, as it were. Then at a later period, during the second dentition, or in adolescence, when the vital powers are severely taxed, if any depressing cause be added, the microbes overcome the feeble resistance of the tissues, and attack the non-vascular cornea, in which cells quickly accumulate to expel the invading microbes, and new roads, for the access of fresh cells, are formed by its vascularisation.

Now this is a very pretty theory, but what facts are there to support it? Infantile iritis is not at all common; on the other hand, as I have shown, iritis very commonly accompanies the keratitis. Again, keratitis may occur, and when it has cleared up, no trace of choroiditis can apparently be found (7 out of 54 cases), and choroiditis almost inevitably does leave some trace in the way of disturbed pigment, or small patches of atrophy; so that it may be fairly concluded that in some cases, at all events, keratitis occurs without antecedent choroiditis.

Then I find I have notes of eleven cases in which one eye only was affected at the time of examination, and in six of these an examination of the choroid of the apparently unaffected eye showed signs of old choroiditis, and in two of these cases the unaffected cornea was watched until it also became affected; and as interstitial keratitis almost invariably does attack both eyes, it may fairly be assumed that the other cornea became affected in the other four cases also. In five cases the choroid was very carefully examined, but no trace of choroiditis could be found—so that we have six cases in which the choroiditis was antecedent, as against five in which it was not. The number of cases is too small to form any general opinion as to which event is the more common. We can only say that either may happen, and that there is no invariable rule.

Then I tried to find out, by direct examination of the fundus of infants with hereditary syphilis, whether the choroid was affected at that period, but I had very few opportunities, and when they occurred the mothers objected to the prolonged examination and to atropine, and the infants were so restless, that I found it impossible to be absolutely sure that there was no choroiditis, and I gave up the attempt. I did find it in one case, however, at 10 months old, but it was associated with neuro-retinitis and optic atrophy. I have also notes of one case, who appeared at Moorfields, with interstitial keratitis at 19, and who brought an old card which showed that, at the age of 11, he had attended with choroiditis. He also had high myopia, but his sister had keratitis, and the history of the family and other collateral evidence showed the specific nature of the case very clearly.

Thus we may fairly conclude, that in some cases, at all events, the choroiditis does precede the keratitis, but in what proportion of cases this happens is undetermined. It also appears that keratitis may occur alone, but I think in by far the majority of cases keratitis, iritis, and choroiditis occur pretty much about the same time.

The age at which the choroiditis occurs is obviously difficult to determine, because its onset causes little or no disturbance in most cases, and it is only found long afterwards. It may be remarked, that Trousseau considers that it occurs at a comparatively late period—9 to 12, or 20 to 25. Out of the forty-five cases in which I found it present, it was discovered before the age of 12 in twenty-one cases; and of these, ten were discovered under 9.

There is only one other point to which I wish to refer. It is generally admitted that choroiditis may occur apart from syphilis; and Hutchinson, after many years' research, concludes that in a few cases it may so occur, and that when it does, the final results are indistinguishable from those of syphilitic choroiditis. As far as my observations go, they are fully in accord with this opinion; but some confirmation of a supposed syphilitic origin has been found in unexpected ways, when the direct evidence seemed very slight indeed, and the extreme difficulty of eliminating the possibility of a syphilitic origin has impressed itself upon me most strongly.

ON THE TREATMENT OF INHERITED SPECIFIC KERATITIS.

By James Jackson, M.D. Lond., M.R.C.S. Eng.

Cases of inherited specific keratitis are so frequently met with in the practice of those specially engaged in ophthalmic work, and even in general medical practice; and, moreover, many of these are so severe, and result in such disastrous consequences to the eyes, that any deviation from the usual mode of treatment which tends to mitigate the severity of the symptoms, or shorten the duration of the disease, and which leaves the cornea free from opacities when the disease has run its

course, is worthy of record. Observations extending over many years, and enquiries made of patients who have suffered severely from this affection, and whose corneæ have become more or less spoiled for visual purposes by dense opacities or leucomata, have led me to believe that specific remedies have either not been employed at all, or only to an extent altogether inadequate to influence favourably the course of the disease.

My usual practice in the treatment of such cases, for a long time past, and that which I desire to bring before the notice of members, has been to use vigorous mercurial treatment from the very onset of the attack, and to keep up the influence of the drug uninterruptedly (short of producing ptyalism) for a period of six weeks or two months, to be followed by ferruginous tonics, and alternating this for some time after with the specific at first used. At the same time, every attention must be paid to the state of the general health, by insisting upon a liberal dietary, and as much open air and exercise as the state of the patient will admit of. Where treatment such as I have indicated is employed, a marked improvement soon manifests itself; and I have noticed that the second eye (which in the ordinary course of events suffers in a similar manner) either escapes altogether, or if attacked, that the symptoms are much milder than would otherwise have been the case.

I am aware that many leading authorities who have written on this subject have expressed themselves as averse to the use of mercurials, preferring a tonic plan of treatment from the commencement, or employing only the iodide of potassium; with this, however, I cannot agree, and my experience leads me to regard the prompt use of mercury as of the greatest importance in mitigating the severity of the symptoms, and inducing a more rapid convalescence, at the same time that the cornea is left more free from opacities and faulty curvature, and the eye therefore more useful as an organ of vision. The form of mercurial used may not be of importance, but that which I usually employ is a combination of the liquor hydrarg. perchlor. with the potassium iodide in full doses, at the same time rubbing in the ung. hyd. co. to the temples, and instilling atropine for the purpose of preventing synechiæ, or in the event of these having already formed (which is too often the case), breaking them by strong preparations of atropine (8 grains ad. ℥j).

Case I.

Miss S., aged 7 years, was brought to see me on August 29, 1887, and four months after the eyes were affected. The pain and photophobia were so severe, that a satisfactory inspection of the eyes could only be made under the influence of an anæsthetic, when both corneæ were found covered with dense opacities, which rendered an examination of the deeper structures impossible. No history of her previous treatment could be obtained, so that I am unable to say whether specific medicines had been used. The liquor hydrarg. perchlor. and potassium iodide in full doses were given, the ung. hyd. co. was rubbed into each temple, and atropine drops were instilled three times daily. At the end of two months a decided improvement had taken place, the pain and photophobia were much less marked, and a steady convalescence ensued. The girl is now fairly well in her general health, but the opacities of the

cornea are so dense, and the astigmatism resulting from the faulty curvature of the cornea is so great, that for visual purposes the eyes are seriously impaired.

Case II.

Maude T., aged 14, came under treatment in May 1884. The left eye, which from infancy showed considerable divergence and was more or less amblyopic, was attacked with kerato-iritis fourteen days before. Three weeks after this the right eye became affected in a similar manner, and corneal haze, with marked impairment of vision, was manifest for the succeeding two months, when, after employing the usual vigorous mercurial treatment, improvement set in, and satisfactory convalescence ensued. The vision of the right eye had so far recovered at the end of the following September (six months from the date of attack), as to enable her to resume her school duties.

The upper incisors showed decided evidences of the specific taint, but were by no means typically malformed. Any doubt, however, as to diagnosis, was removed by the fact that a clear history of specific infection was elicited from the mother, and that a brother, whose incisors showed characteristic lesions, subsequently suffered from kerato-iritis. At this date (four years after the attack), vision Oc. Dex $= \frac{6}{9}$ and No. 1 Jäger, with the cornea apparently quite free from opacities, and this, notwithstanding that one year ago the eye became attacked with glaucoma of a very acute form, for the relief of which an iridectomy was performed.

Case III.

Ernest T., a brother of the patient above referred to (and whose case has already been incidentally mentioned as presenting the characteristic dental lesions), was brought to me in May 1887 with kerato-iritis of the left eye. The usual specific treatment was employed, when steady improvement soon set in, leaving the cornea perfectly clear, and without any trace of opacity—$V = \frac{6}{18}$, and No. 1 Jäger. On further examination, the defective vision for distant objects above noted was found to be due to a previously existent astigmatism. The other eye escaped altogether, and up to this date remains well. In both the latter cases, the general health underwent a marked improvement.

Case IV.

Miss S., æt. 19, of Kyneton, was sent down to see me by her medical attendant on August 29 of this year. This young lady, a person of strumous habit, and markedly anæmic appearance, was suffering from acute kerato-iritis of the right eye, the affection having already existed for one month. The pain and photophobia were extremely severe, making a satisfactory inspection of the cornea a matter of some difficulty. The cornea was found to be densely covered with haze of the usual ground-glass character, the ciliary zone of vessels was well marked, and after the application of a strong preparation of atropine with vaseline (grs. viii. ad. ℥j), no mydriatic effect was in the least degree perceptible, posterior synechiæ being nearly complete. The lids and soft parts surrounding the eyes were in a state of acute œdema, accompanied by more or less chemosis. There was not much difficulty in making a

diagnosis, the local lesions of themselves sufficing to establish this, but an inspection of the teeth removed any doubt that may have existed, the upper incisors exhibiting in a marked degree those peculiarities of form, &c., so frequently met with in cases of this kind. Specific medicines in full doses were administered, the ung. hyd. co. rubbed into the temples night and morning, and a strong preparation of atropine and vaseline (grs. viii. ad ℥j) was persistently used to break down adhesions to the capsule, a matter of considerable difficulty. For six weeks this treatment was persevered with, at the end of which time a marked improvement had taken place, the pain and photophobia had disappeared, and the iris was found to be nearly free from adhesions, one or two tags of synechiæ alone remaining. About this time the left eye became affected, but the attack was altogether of a much milder character, and at the end of a fortnight, the more acute symptoms had almost entirely disappeared, leaving the cornea clear and the iris altogether free from adhesions—V 12 and L = $\frac{6}{9}$ and No. 1 Jäger.

Case V.

Miss K., æt. 15, was placed under my care on September 28, 1888. Four weeks had elapsed since the right eye was attacked. The cornea was covered with a dense haze, which limited vision to mere p. l. The sclerotic zone of vessels was well marked, and pain and photophobia were complained of.

Although in this case an examination of the incisors threw no light on the nature of the case, the earthy physiognomy, cicatrices at the angles of the mouth, and a history of infection in one of the parents, placed the diagnosis beyond a doubt. After the usual specific treatment was adopted, a rapid improvement in the general health took place, and the corneal haze is now represented by one opaque dot, scarcely exceeding a pin's head, which occupies the centre of the cornea. So far, the other eye has remained free from attack.

Case VI.

N. M., æt. 26, consulted me on July 26, 1888. The right eye, which had already been affected for three weeks, showed dense corneal haze, with a well-marked sclerotic zone of vessels. There was also a moderate amount of photophobia, with slight pain. After vigorous specific treatment had been persisted in for six weeks, the cornea was left faintly covered with haze, which, under the influence of massage with ung. hyd. flava, is rapidly disappearing. Up to this date, the left eye has remained free from attack. In this case, the dental lesion is characteristic.

[Dr. Jackson exhibited the cases referred to.]

Dr. Symons (South Australia) said two points arose in his mind: the possible toxic effects of strong solutions of atropine—he had never used anything stronger than six grains to the ounce; also, what is the maximum age at which interstitial keratitis can occur? The oldest patient he had ever seen suffering from it was aged 42.

Dr. Duncan (Kyneton) spoke relative to the question of the possible toxic effects of using atropine in strong solution. He used it eight grains to the ounce; he had seen atropine irritation, and sometimes

dryness of the throat, result, but never anything more. With respect to the causation of interstitial keratitis, he should regard all cases as specific in so far as treatment was concerned.

Mr. SYME (Melbourne) said the effect of mercury in the treatment of interstitial keratitis is marked. The disease can occur to an advanced age. Half the cases are over fifteen years; the oldest patient he had seen was aged 32. It was necessary to remember that, in cases of an advanced age, there is always a possibility of the keratitis being due to acquired, and not to hereditary, syphilis. The idiosyncrasy patients exhibit to atropine is remarkable. In the later stages, when the redness has disappeared, yellow ointment and massage are valuable auxiliaries. Atropine should be used as a routine remedy in this disease.

Dr. BARRETT (Melbourne) was in the habit of using atropine ointment, eight grains to the ounce. He considered the action more powerful and more safe than that of atropine used in solution. He quite agreed with Mr. Syme, that atropine should be used as a matter of routine in all cases of interstitial keratitis.

Dr. JACKSON replied to the effect that he quite agreed with Dr. Barrett as to the relative danger of using atropine ointment and atropine solution. Toxic effects might result (when the solution is used), from the solution finding its way into the canaliculi and nasal duct.

THE DANGER OF OPERATING ON EYES IN CASES IN WHICH MUCOCELES CO-EXIST.

By JAMES W. BARRETT, M.D., M.S., F.R.C.S. Eng.

Assistant Surgeon to the Victorian Eye and Ear Hospital, and Demonstrator and Examiner in Physiology in the University of Melbourne.

I believe most ophthalmologists are aware of the danger of extracting cataract in cases in which the eye is the subject of chronic conjunctival affections, and of mucocele. The fact that a slight affection of this nature may be quite sufficient to ruin an operation was insisted on by Streatfield.

It would seem that in such cases, it is quite impossible sometimes to render the conjunctival sac aseptic; and consequently, when the eye is bandaged up, micro-organisms, kept warm and moist, multiply, and ultimately enter some part of the large cataract section, causing either local sloughing, or if they penetrate far enough, panophthalmitis. Yet, apart from the cataract operation, I was not aware that there was great risk in operating on such eyes. It is a matter of every day experience to see performed iridectomies in cases of trachoma, and in cases of rodent ulcers of the cornea. Personally, I have made more than one puncture in the anterior chamber quite three millimetres long, in cases of gonorrhœal ophthalmia, and with good results. In these cases, however, the eyes were not tied up after operation. Still, I had rarely

seen unfavourable results follow iridectomies in such cases as I have referred to, and I was quite unprepared for the following disastrous case which, as far as I know, is without parallel:—

Mary W., æt. 60, was admitted into the Eye and Ear Hospital in September last, under the care of Dr. Bowen. In his absence from Melbourne I had charge of his patients. She was suffering from double mature cataract, for which I determined to perform preliminary iridectomies.

On September 18, 1888, I performed a large upper iridectomy on the right eye, previously anæsthetising it with the usual aseptic solution of cocaine and boracic acid. The eye was bandaged up for forty-eight hours in the usual way, and at the end of that time the wound had healed; the eye was quiet, and showed little reaction.

On September 22, I was about to perform a similar operation on the left eye—which had been anæsthetised with a cocaine and boracic acid solution, freshly made up—when I noticed on the lower lid a small quantity of gelatinous mucocele fluid. I squeezed the sac, and got away a little more fluid. I then examined the other eye, and found it in exactly the same condition. The conjunctiva of the left eye was white, and the mucocele was so slight that, as stated, it had been quite overlooked. I carefully cleaned the left eye, and then washed the conjunctival sac with a solution of bichloride of mercury—1 in 5000. An upper iridectomy was then performed, through a comparatively small incision, and without the least trouble. The eye was bandaged up, and the patient put to bed.

In both cases, the knife used was the triangular sclerotome. The same instruments were used by me a few minutes later for the performance of another iridectomy for closed pupil—a case which did well.

Twenty-four hours after the operation, the patient complained of severe pain. The bandage was removed, when yellow lymph was seen in the pupillary area. An attack of panophthalmitis had set in, and ultimately the eye was destroyed. The iridectomy on the other eye remained a success.

Here, obviously, the disastrous result was due to the infection of the eye through the small puncture made with the sclerotome. I do not think it at all possible that the infection was made by the instruments, which were kept cleaned, and dipped in absolute alcohol prior to use. In fact, the successful result of the iridectomy performed with the same instruments, with the use of the same cocoaine solution, a few minutes later, tends to confirm this view. The infection was almost certainly due to the septic character of the lachrymal sac and conjunctiva.

I do not think further comment is necessary, but I thought I could not do better than place such a case on record. If I am compelled to operate on such an eye again, I shall slit up the canaliculi, and thoroughly wash the sacs for some time prior to operation.

I may add that in this case, subsequent to the attack of panophthalmitis, the canaliculi were slit up, and little or no fluid was evacuated, so slight were the mucoceles.

Dr. Jackson (Melbourne) said that he had performed the cataract operation on the eye of a patient who suffered from chronic ophthalmia. Suppuration set in two days afterwards, as a direct result of septic

infection of the wound, and the eye was lost. He should hesitate in the future to operate in such cases.

Dr. DUNCAN (Kyneton) said that he could not understand the manner in which a mucocele could infect the wound. He had performed a preliminary iridectomy in a cataract case in which there was no mucocele, and no suspicion of septic infection; yet panophthalmitis had set in, and he had been compelled to excise the eye.

Dr. M. J. RYAN (Kyneton) had seen Dr. Duncan's case.

Mr. J. T. RUDALL (Melbourne) said that a few years ago we were taught that the entrance of microbes alone could cause suppuration. He now noticed that the subject was opened up again, and that experiments had been performed, which seemed to show that such irritants as mercury and turpentine, introduced under the skin, could cause suppuration in the absence of microbes.

OCULAR SYMPTOMS DUE TO DISEASES OF THE NASAL CAVITIES.

By T. K. HAMILTON, M.D., F.R.C.S.I., Laura, South Australia.

The subject I have chosen to bring before the Section is one, I think, of great interest, and of considerable practical importance to the ophthalmologist. I am not sure that there has been anything written up to the present on this subject in our Australasian colonies, nor can I find much reference to it amongst the writings of specialists in Great Britain. It is from America and the continent of Europe most of our information comes.

Of the continental writers, I would refer particularly to Bresgen ("Der Chronische, Nasen- und Rachen-Catarrh," 1881, Band 1, and "Grundzüge einer Pathologie und Therapie des Nasen-, Mundrachen- und Kehlkopf-Krankheiten," 1884), who was the first to draw the attention of specialists to the fact, that conjunctival catarrh is largely dependent upon so-called nasal catarrh, and that it will not disappear until the latter be relieved; Ziem, Dantzig (*Centralblatt f. Prak. Augenheilkunde*, December 1887); Nieden, Bochum (*Arch. Ophthal.*, December 1887 [translation]); and Peltesohn, Berlin (*Centralblatt f. Prak. Augenheilkunde*, February 1888). And of the American—Gruening, New York (*New York Medical Record*, January 1886); Gradle, Chicago (*Chicago Medical Journal and Examiner*, March 1887, and *Arch. Ophthal.*, December 1887); Cheatham (*American Practitioner and News*, 1887), and Bettmann (*Journal American Medical Association*, May 1887, and *Revue des Sciences Médicales*, Fasc. I., 1888).

I have endeavoured to work out the subject as thoroughly as possible, so far as the time during which I have been making my observations would allow, and I hope to be able to establish to your satisfaction a very distinct and close connection between the eye and the nasal cavities, as evidenced by symptoms and reflex phenomena discoverable in the former and co-existent with diseases in the latter.

In the first place, by way of preface, allow me to point out briefly the relation these cavities (nasal) stand in to the eyes anatomically.

In addition to the direct continuation of the epithelium of the nose with that of the eye, there are distinct vascular and nervous connections.

(1) *Arterial.*—The ophthalmic artery supplies the anterior and posterior ethmoidal, which, passing through the cribriform plate of the ethmoid, reach the nose and go to nourish the anterior part of the septum and the lateral portions of the nasal cavities, anastomosing with the nasal or spheno-palatine of the internal maxillary. In addition to this, Zuckerkandl has shown that there is a direct arterial communication passing along the naso-lachrymal canal. The naso-pharynx has likewise some arterial supply from the internal maxillary, and is thus indirectly introduced into the nasal vascular circuit just referred to.

(2) *Venous.*—The veins of the nose anastomose extensively with the ophthalmic vein through the plexus lachrymalis, and some find their way into the cavernous sinus.

(3) *Nervous.*—The nasal of the ophthalmic supplies, through its internal and external branches, the upper and anterior part of the septum, and the outer wall of the nasal fossæ, which nerve at the same time, through its long ciliary and infra-trochlear branches, goes to form part of the ciliary ganglion, and to supply various parts of the eye; and again, through this same ganglion, to give branches to the ciliary body, cornea, and iris. Once more we have the spheno-palatine going to form Meckel's ganglion, which in turn, through its anterior superior naso-palatine and vidian branches, supplies the nose; and through its external posterior and pharyngeal, with the vidian again, the upper part of the pharynx.

The following is an abstract of the cases :—

Case 1.—Empyema of the antrum and unilateral hypertrophic rhinitis of the left side, attended with eye symptoms :—(1) Concentric contraction of the visual fields for all colours. (2) Accommodative asthenopia. (3) Retinal hyperæsthesia. (4) Peculiar subjective sensations of light. (5) Photophobia, with blepharo-spasm and infra-orbital neuralgia. The evacuation of the empyema and its cure were speedily followed by the disappearance of the eye symptoms.

Case 2.—Ecchondrosis of the triangular cartilage and chronic rhinitis. This case was attended with the following eye symptoms :—(1) Asthenopia. (2) Pain in the eyeball. (3) Injection of the eyes when used for close work. (4) Blepharo-spasm. (5) Contraction of the visual fields. These symptoms disappeared on the removal of the growth.

Case 3.—Spine of the bony septum, causing chorea magna. The following eye symptoms were present :—(1) Asthenopia. (2) Subjective colour sensation. (3) Sneezing. (4) Contraction of the fields of vision. These symptoms disappeared on the removal of the spine.

Case 4.—Advanced chronic atrophic rhinitis, with middle turbinate hyperplasia. The following eye symptoms were present :—(1) Asthenopia. (2) Lachrymation. (3) Puffiness of the lower lid. (4) Contraction of the visual fields. These symptoms were relieved by the treatment of the nasal condition.

CASE 5.—Syphilitic ozæna. The following eye symptoms were present :—(1) Asthenopia. (2) Lachrymation. (3) Pericorneal injection on using the eyes. (4) Contraction of the fields of vision, which was temporarily removed by the use of amyl nitrite. These eye symptoms ameliorated as the nose improved.

CASE 6.—Polypi, nasal and naso-pharyngeal, with eye symptoms similar to those recorded.

CASES OF POST-NASAL GROWTHS.—In 106 cases, eye diseases co-existed in 51 ; in 22, catarrhal conjunctivitis ; in 7, follicular conjunctivitis ; in 16, granular conjunctivitis, and in 6, blepharitis (marginal).

One typical case of post-nasal growth, with reflex eye symptoms, is recorded. There was asthenopia and limitation of the field. The growth was removed, and the eye symptoms disappeared.

A CASE OF DOUBLE GLAUCOMA FULMINANS.

By GUIDO THON, M.D.

Mrs. T., æt. 45, married, six children, was seized with violent pain in the right eye on the early morning of the 4th of April last, attended with vomiting, and followed in a few hours by loss of vision.

On the early morning of the 23rd of April, similar symptoms appeared in connection with the left eye. In both cases there was some conjunctival injection.

On April 28th, she was seen by the writer, who found the eyes small and receding. The blindness was absolute, the patient being unable to distinguish night from day.

Appearances :—Right eye T + ; some conjunctival injection ; cornea a little cloudy ; pupil seven to eight millimetres in diameter, immovable ; anterior chamber shallow ; fundus reflex, faint. Left :—Conditions similar, but not so marked.

On April 30th—twenty-five days after the attack in the right, nine days after the attack in the left—a downward iridectomy was performed on the right eye ; the iris was rotten ; the lens was touched with the knife during the operation, on account of a sudden rush forward. The iridectomy in the left eye was successful.

Ultimately the wound in the right eye healed, but the eye remained irritable and was ultimately excised. The left eye did well, and vision was recovered to the extent of distinguishing shadowy outlines of large objects, although there was an opacity on the anterior surface of the lens.

POST-NASAL GROWTHS.

By T. K. Hamilton, M.D., F.R.C.S.I., Laura, South Australia.

During the past twelve months, I have examined in detail the upper respiratory tracts (and in many cases the larynx also) of about 260 individuals, between the ages of two and a half and twenty-five years, with a view of forming some idea of the relative frequency of post-nasal growths and enlargement of the pharyngeal tonsil in the colony of South Australia. Out of this number, eighty-four had post-nasal growths, and thirty-two enlargement of the pharyngeal tonsil. You will notice I make a distinction between post-nosal growths and enlargement of the pharyngeal tonsil. I do this more to emphasise the fact that, in the former, the growths were large, irregular, and distinct; while in the latter they were regular, lobular, and more joined together—in fact, only a hypertrophy of the normal lymphoid structure of the naso-pharyngeal vault. There is really no physical difference between the two affections; it is merely one of degree.

About the actual locality from which these growths spring, there is some difference of opinion amongst authorities. Trautmann, for example, maintains that they grow only from the roof of the cavity, and never from the sides; and he says he has verified this statement by post-mortem examinations. He admits, however, they very frequently seem, in the rhinoscopic image, to spring from other places than the roof, but this, he says, is an optical delusion.

Now, as far as I can make out, the anatomical position of the pharyngeal tonsil itself is opposed to this view; for this body, in the normal condition, occupies not only the roof and upper part of the posterior wall of the naso-pharynx, but also extends laterally into Rosenmüller's fossæ, and even on to the Eustachian cushions. If this be so, and if post-nasal growths are only, as stated above, an excessive development of this tonsil, we are not surprised to find the majority of authorities taking exception to this, the view advanced by Trautmann. Moldenhauer says:—"From my own numerous observations on the living subject, I find that this assertion of Trautmann's requires further confirmation. It has not infrequently happened to me," he continues, "that after the removal of the growths from the roof and the posterior wall, still swellings remain which seem to spring from the fossæ of Rosenmüller, and the mouths of the tubes are more or less covered." Schech supports this view also; but the most recent authority on the subject is Rostanecki, who, after reviewing the existing literature, and comparing it carefully with his own thorough investigations, comes to the conclusion that the pharyngeal tonsil may extend to the tuberosity of the tubes, and even into the ostium, and that those modern authors who state otherwise are wrong. I have referred thus fully to this, because the question of exact locality has a practical importance, as we shall see presently, when we come to deal with the removal of the growths. I myself have, in several of my cases, been able to observe the growth proceeding from the lateral aspects of the cavity, and by digital examination to make myself absolutely certain of the fact.

Next, as to the etiology of the growths. This I think, especially to us in these Colonies, is a most interesting question, and one on which I trust my remarks may elicit some discussion, as I am anxious to arrive at correct conclusions. Some eminent authorities, such as Bresgen, Lange, and Semon, believe they are congenital, and that they are not observed until several years after birth, on account of their slow development; but Schech points out, that the predisposition of children to the affection is not remarkable, since other organs, such as the tonsils, are in childhood very often affected with hyperplasia. No dissections, however, of new-born infants have confirmed this congenital theory.

According to Trautmann, ten months is the youngest age at which they have been found to exist. The difficulty experienced in examining the naso-pharynx in very young children will, I believe, always prove an obstacle in the way of getting statistics from the living subject. An attempt made by me recently to examine an infant of eight months, only convinced one how difficult, indeed how impossible, it is to get the index finger round the soft palate into the small cavity above. One feels as if the pressure necessary to get round the corner would, if persisted in, disturb some of the bony relations, and you feel irresistibly inclined to desist.

The next question to decide is—Are these growths a "scrofulous" development? There seems to be a good deal to be said in favour of this origin. Many authorities who live in cold and damp climates (where we know scrofula prevails largely), cling tenaciously to this theory, and seem to think scrofula, and it alone, is the cause. They point to family tendency to these growths, and tell us that, not only do they find them amongst several or all of the younger members of the same family, but also that the affected individuals show other signs of scrofula, especially enlarged cervical glands. Löwenburg ("Les Tumeurs Adenoides," Paris, 1879), has seen in some cases transmission from the parents to the children, whilst Trautmann considers that the children of tubercular parents are predisposed to the disease.

Again, other observers, such as Schulté, Milan (*Arch. Otology*, March 1888, p. 92), believe that the conception of scrofula can be dispensed with, as the so-called scrofula essentially consists of nasal suppuration—the latter is the cause of the growths; and according to this theory, and to the analogy of other mucous membranes, Ziem believes the growths disappear entirely after the removal of the greater part, and the treatment of the chronic suppuration.

From what I have been able to observe as to the original cause of these growths in England and Germany, and more recently in these colonies, I have come to the conclusion, that while constitutional tendency enters largely into their causation, it is not the only cause. There may be in all, at any rate in many cases, a strong predisposition to excess of lymphoid development in these individuals; but there are also, unquestionably, exciting causes to which, if these same individuals be exposed, they are sure to develop the growths, and which they would have probably escaped had they been more advantageously circumstanced—this applies particularly to the development of post-nasal growths in our Australian climate. It has doubtless occurred to many of you as a singular thing, that post-nasal growths should be of such very common occurrence in our dry and warm climates of Australia, while other

evidences of scrofulous developments are comparatively infrequently seen; *e.g.*, enlarged cervical glands, so very common in the colder and damper climates, even amongst those who are fairly well nourished, are rarely seen here, at any rate in the country districts. My cases are drawn principally from amongst an agricultural population, who are supposed to live under more healthy conditions than those congregated in our large centres; nevertheless I find I have amongst the youth of this population a large percentage of post-nasal growths. But of all my cases, I can only find record of one case of enlargement of the lymphatic glands in the neck, and this is the more remarkable when we remember that a catarrhal condition of the nose so frequently exists with post-nasal growths, and that there is a very distinct and direct lymphatic connection between the nasal cavities and the cervical glands, most of the nasal lymphatics opening into the glands, either at the parotid, or those adjacent to the sterno-mastoid muscle.

I have observed closely many of my cases, and have found the growths occurring in children, themselves apparently fairly robust (when the growths were not in quantity enough to cause defective development), and the offspring of healthy parents; and moreover, no sooner are the growths removed (as if they, and they only, were the sole offenders), than most of the cases rapidly assume a healthy appearance; this would not be so if a marked diathetic vice were the sole cause. This brings me to the point I wish for a moment to dwell upon. I have endeavoured to show that scrofula, or in other words, inherited constitutional tendency, cannot be the only cause of these lymphoid developments, as we find them so common in such climates as that of South Australia, where other scrofulous diseases are of infrequent occurrence, and I shall now try to point out to you what other evils are at work, as exciting causes tending to bring about similar results.

To establish this theory, allow me to refer briefly to the researches of Hingston Fox, and more recently of Spicer, as showing what the functions of the faucial and pharyngeal tonsils really are. They have found that the functions of the faucial tonsils are essentially those of absorbing the buccal secretions and of the manufacture of leucocytes, and that the pharyngeal tonsils do the same with reference to the spent nasal and lachrymal secretions.

Let us confine our attention, in the first place, to the pharyngeal tonsils. Many causes contribute in the general economy to alter the condition of the blood, and render it impure. This in time affects certain parts locally, *e.g.*, chronic nasal catarrh is specially mentioned as a result, and this catarrhal condition in turn, through the absorption of unhealthy products by the lymphoid structure in question, leads to an inflammation and hypertrophy—in other words, to "enlargement of the pharyngeal tonsil, and if excessive, to post-nasal growths." This theory offers, according to Spicer, a complete and satisfactory explanation of the pathogeny of post-nasal growths.

That chronic nasal catarrh co-exists with the growth in the naso-pharynx, is a matter of daily clinical experience—not always, however, a nasal blenorrhœa, nor even a hypertrophic rhinitis, for in most of my cases I find, if they be at all chronic, more atrophy than anything else. A very common condition is atrophy of the inferior and hypertrophy of the middle spongy bones; or again, atrophy in one nostril, and hyper-

trophy or a normal condition in the other. Out of thirty-five of my cases in which the condition of the nostrils is recorded, I find atrophy more or less present in twenty-six, and hypertrophy only in seven.

What is the origin of this chronic nasal catarrh? Is there any catarrh children are so liable to as nasal? I think not. We frequently see catarrhs originate in an attack of one of the exanthemata, and become chronic afterwards. This may, in children of lymphatic tendencies, be the starting-point of any lymphoid enlargement; but this catarrh much more frequently comes on idiopathically, as secondary to derangement of the general alimentary system. This derangement has its origin somewhere in the digestive tract, and secondarily affects other parts of the body. Let us see how it comes about.

The excessive consumption of animal food in these colonies is notorious. Even young children are allowed to eat meat at all three meals, and that daily. This nitrogenous food is taken to the exclusion of starchy and other foods more suitable for youthful digestion and assimilation. Along with this they are given, also at all three meals, tea to drink in quantities. Tea is said to delay the digestion of the proteids, and the quantity imbibed must necessarily dilute the gastric juice and prevent its action on the food until the excess of water is absorbed. Again, the large consumption of sugar and saccharine materials amongst children is injurious. Sugar is known to be eminently catarrhal, and is now, by most authorities, recommended to be excluded from the diet of those who have such tendency. My own observation has abundantly proved that an abstinence from all kinds of sugar has made those who suffer from the various catarrhal conditions of the throat and nose (many of which are only secondary to gastric or intestinal catarrh) much less susceptible. There are, of course, other contributory causes—*e.g.*, rapid or sudden changes of temperature, so common in certain seasons in our climate; neglect of cleanliness or attention to one of the most important excretory organs of the body—the skin; but I cannot do more than mention these here.

The analogy which has been proved to exist between the pharyngeal and faucial tonsils at once explains how it is that we nearly always find hypertrophy of the two co-existing in the same individual. Out of 116 cases of post-nasal growths, ninety had enlarged tonsils; and out of the 260 throats examined, 132 had this complication; and, further, out of this last-mentioned number, there were thirty-nine cases in which the left tonsil was larger than the right. This may be of some interest to notice in passing, as we know that in the case of at least one other of the double organs of the body, this also occurs. I refer to the testes.

Once more, the rough condition of the posterior pharyngeal wall, which invariably accompanies post-nasal growths, is only a similar lymphoid hypertrophy; and hence, having the same histological and pathological origin, we would expect to find them, as we do, so constantly co-existing, that the presence of the one on the lower pharynx almost certainly implies the presence of the other higher up.

To recapitulate briefly, this then is my contention. Scrofula, or some such diathetic tendency may, in many cases, exist as a strong predisposing cause to lymphoid hypertrophy in the pharynx and naso-pharynx; but there are exciting causes which, in these dry climates, unfavourable

to scrofulous developments, determine the existence of post-nasal, pharyngeal, and faucial growths much more surely than diathesis alone; and these causes are principally connected with digestive derangement induced by an unsuitable dietary, and one in keeping with neither the climate nor the digestive or assimilative powers of the individuals.

I cannot do better, in concluding this interesting part of the subject, than quote the remarks recently made by Beverley Robinson (New York). He says:—"Catarrhal troubles are sensitive to reflex influences, wherever other organs are affected to any extent, and wherever the nutrition and general tone of the system is interfered with. Next to local causes it is a frequent source of the origin and aggravation of catarrhal trouble. Chronic indigestion presents many examples of this, both through reflex influences, or by its disastrous effects on the bodily nutrition—some cases in which the condition of the alimentary canal was proved to be alone responsible for the origin of the catarrhal trouble."

Signs and Symptoms.

Of the signs and symptoms connected with post-nasal growths, I will only refer to some of the rarer ones, the others being too well known to repeat:—

(1) *Noise and Difficulty in Swallowing.*—I had two illustrations of this. The patient, as it were, made a double effort to swallow, sometimes at the same time making a noise extremely disagreeable to those joining in the meal.

(2) *Laryngismus Stridulus.*—Of this I had four instances, and as far as I can tell, the removal of the growths has caused these attacks to cease. Hering (of Warsaw) refers to this as a symptom of nasal disease (spasme laryngé).

(3) *Cough (Useless), and Hawking.*—This is fairly constant as a symptom, and, in the absence of other disease, should lead you to examine the naso-pharynx before you do, what I think is nowadays too often done, place the case in the category of the "neurotic."

(4) *Asthenopia.*—Referred to in my paper, "Ocular symptoms due to disease in the nasal cavities."

(5) *Epistaxis.*—One does not wonder at this occurring, as the growths are themselves so vascular, having a special arterial and venous supply for each growth separately.

(6) *Defective Nutrition.*—This is extreme in some cases. One child, from whom I removed both post-nasal growths and enlarged tonsils, only weighed thirty-six pounds. She was 7 years old, and in ten days after the operation she had gained two pounds. It is marvellous how children begin to pick up after the removal of growths, when the growths have been, as they always do in cases where there are large numbers, interfering seriously with their nutrition and development.

(7) *Deafness.*—This is one of the commonest and most important of all the concomitants of post-nasal growths. Out of my 116 cases, forty complained of deafness more or less, some very extreme, and in eight of these cases there was perforation of the membrane and otorrhœa.

The intimate relation of post-nasal growths to middle ear disease is of great importance, as shown by Meyer's statistics; he has found middle

ear disease in 70 per cent. of his cases of post-nasal growths; and Gradle has found that, in more than one-fifth of the children brought to him for ear disease, there is hypertrophy of the pharyngeal tonsil. These statistics show how important it is, that in all children who suffer from recurrent or chronic middle ear disease the naso-pharynx should be carefully examined, and growths removed when they exist.

Greville Macdonald lays it down as a rule, that where deafness exists the growths should always be removed, even though they be comparatively few in number and small. I removed a moderate number of growths in a case like this from the naso-pharynx of a weakly lad, aged 12 years, who had constantly recurring though slight suppurative catarrh. The result has been most satisfactory. He has not had any return of discharge since their removal.

The following two cases are typical, showing the very distinct connection existing between the growths and the otorrhœa :—

In case No. I.—The otorrhœa had been of long standing (two and a half years), in ten days it is cured, and has never returned since.

In case No. II.—Double otorrhœa of four years' standing, following scarlatina; eleven days of treatment, after the removal of the growths, sufficed to stop the discharge, which has never returned.

Methods of Examining.

A very few words as to the methods of examining for post-nasal growths. Killian (Hartmann's "Klinik," Berlin) points out the great advantage of anterior rhinoscopy in the diagnosis of growths, but says you must use cocaine to reduce the inferior turbinates, in order to get a good view. The Germans all lay stress upon this mode of examination, but I frankly admit I seldom or never resort to it, as I have always found so little good resulting from the examination. You may see parts of the growths if they be isolated, but as to coming to any conclusion as to their number, position, or size, I never could, hence either posterior rhinoscopy or the digital examination are what I always practise. Posterior rhinoscopy gives, as a rule, uncertain information; it is very satisfactory, in one sense, to see the objects you are going to remove, but on account of the great perspective shortening with which the parts under examination are represented, the lowest tumours only can be observed, while those lying above are either quite concealed, or appear much smaller; hence the digital examination is much the most satisfactory and reliable. The correct method of procedure probably is this :—See what you can through the anterior nares, then examine by posterior rhinoscopy. If you can get any image at all, you can usually satisfy yourself from the appearances, taken along with the symptoms of the case, whether it be one for operation or not. You may then reserve your digital examination until you are operating, when you can by a few sweeps of the finger determine accurately the condition of the growths, before applying the instrument you are about to use for their removal; this saves the patient the unpleasantness of one examination with the finger, which is desirable. If, on the other hand, you fail to get a post-nasal image, as you so often do in children, there is nothing for it but a digital examination there and then, and of all examinations it is the best. I find I can often, by a little delicate manipulation of Michel's rhinoscopic mirror, avoiding carefully any contact with the posterior pharyngeal wall, at the same time pressing the

back of the tongue well down with a Fränkel's tongue depressor, get an image impossible to obtain by the ordinary mirror. The paretic condition of the velum, and the semi-anæsthetic condition of the posterior wall, facilitate posterior rhinoscopic examination in many cases very considerably. Lastly, as to the

Methods of Removal of the Growths.

Out of the 116 cases (referred to already), I have operated on sixty-six. One has to consider the age at which it is desirable to operate ; about this there is no rule. I have operated on two children at the age of 4 years, but there is some difficulty in children under 5 years frequently. The cavity is so small, that it is not an easy matter to get your finger and an instrument into it at the same time. If symptoms exist which require the removal of the growths, I think the sooner they are removed the better. Stoker (London) points out that physiological idleness means arrest of development, and the sooner the obstruction is removed, the less the deformity ; so the circumstances of each case will form the best guide as to when you should operate.

I have given up using any general anæsthetic, as I think it is quite unnecessary. Some recommend chloroform, pushed to cause complete anæsthesia, and others use ether for similar purposes. As I have just said, I think any anæsthetic unnecessary, and perhaps positively injurious if complete anæsthesia be caused, for then you arrest reflex action, which it is particularly valuable to retain, in order that the patient may be able to cough up any blood which may find its way into the larynx, as it often does, no matter what position the head is placed in.

I sometimes apply 10 per cent. solution of cocaine to the interior of the nose (especially when about to use Meyer's ring knife), to the naso-pharynx, into which cavity I inject a few drops (patient lying down, with head low) with a small post-nasal syringe (made for the purpose by Windler, Berlin) through the nostril ; and finally to the posterior wall, &c., with cotton on a cotton-holder. In addition to this, I generally now give the patient a large dose (gr. xxx to xl) of bromide of potassium, half an hour previous to the operation ; latterly, I have given or applied nothing but this, and it makes the greatest possible difference in the tractability of the patients, both young and old. McKeown it was who recommended this in small operations on the eye, *e.g.*, tenotomy in strabismus, &c., and I find it particularly suitable for nasal and post-nasal operations.

The position of the patient.—He is made to lie on a low couch, with the head hanging over the end, and lower than the rest of the body, so that the blood will flow back out of the nostrils, and not downwards into the larynx ; though it is often impossible, even in this position, to avoid the latter entirely. This position is by far the best, more especially for the removal with any of the forceps instruments, but the couch should be low, so that the operator is well above his patient. This is also a most convenient position for the removal of tonsils, especially in young children. If the tonsils are enlarged, I remove them first ; this clears the way for gaining access to the naso-pharynx, and when the hæmorrhage is ceased, I attack the growths.

Of the many instruments in use for removing post-nasal growths, I find none so universally suitable as Woakes' modification of Löwenburg's

forceps. I generally use it, unless I find that the shape and position of the growths are such that they can be readily included in the cutting range of a Gottstein's knife. This instrument is used a good deal in Germany, and the patient operated on in the erect posture with it.

The good rule laid down by Meyer is likewise now adhered to; his rule is—"no instrumental removal of post-nasal growths should be attempted, unless the instrument be guided either by sight or touch." I know it is not so easy to manage digital exploration with a sharp-cutting instrument, still I try to combine the two as far as possible, and therefore operate with Gottstein's knife, with the patient in the same position as that adopted when the forceps are used. If the growths also spring from the lateral aspect of the cavity, this knife is not suitable for the removal of this portion of the tissue. You will find the forceps come in there best.

As to Meyer's ring knife, there are many cases in which it is impossible to use it. We so frequently find the nasal cavities small and ill-developed, as a result of post-nasal growths, that in a large number of cases they will not, even after cocaine has been used, admit this knife; or frequently you will find one nostril admit it, and the other too narrow; you can then put a curve on the instrument, and manage to reach a good portion of the roof. When you get it into the cavity, it is a splendid little instrument to scrape away all remains left after the forceps.

Trautmann's sharp spoon I have used; but I think with it you will find it hard to reach the anterior part of the naso-pharynx, as the diameter of the instrument is so great.

AURAL DISEASE AND EPILEPSY.

By C. L. M. Iredell, M.R.C.S.

I approach the subject of the relation of aural disease and epilepsy with the greatest possible diffidence, feeling, as I do, that I can only bring to bear upon it some little practical experience, tending to show that the relationship is causal, but wanting those refinements of research that belong more properly to pathology.

It is extremely interesting to me to trace as I can the gradual manner in which the importance of aural disease in its relation to brain disease has become recognised. The significance of chronic disease in this region has, in fact, only forced itself into prominence during the last few years—say fifteen. It was generally understood that occasionally severe inflammatory conditions of the middle ear resulted in abscess within the cavity of the cranium, but that this occurred from, or was in any way connected with, that state known simply as chronic discharge from the ear, was not accepted; and, indeed, not infrequently was it considered as the direct result of any treatment that may have been adopted with a view of checking such discharge.

That all this has been changed may be best seen from the fact that the larger insurance companies now positively refuse to accept any one

having a discharge from the ear, though this is clearly a mistake, as considerable discharge may exist without any perforation, and perforation may exist for lengthened periods without discharge.

It is, however, to the more obscure and less immediately fatal conditions that I would now allude. Fearing always lest one should come under the charge commonly made against specialism, of considering every condition as being one immediately connected with one's subject, I feel that I have neglected to take sufficient notice of many valuable instances bearing upon this matter. So much do I feel this to be the case that, while I have largely before my eyes quite a number of cases, I have preferred to illustrate my paper by some three or four which have come under my observation during the last two years. These, which I think fairly typical, have offered themselves since I have more particularly considered this subject. I have no doubt that much of the obscurity which surrounds this class of disease arises from the difficulty that exists in obtaining sections of this portion of the cranium. Nor, indeed, has it been the custom to look at all carefully in this direction, except in those cases where there has been reason to associate the cause of death with caries or abscess. It therefore follows, that much of that which I have to advance is hypothetical, and open to correction by further investigation.

In the introduction to Byrom Bramwell's book on "Intracranial Tumours," I find the following:—"The brain and its membranes are favourite situations for the formation of new growths. In no other situation in the body is such a great variety of tumours met with; it would almost indeed seem that the delicate and soft brain-tissue, richly supplied as it is with blood-vessels and lymphatics, is as fine a forcing and feeding ground for new growths, as Koch's nutrient jelly is for micrococci and allied organisms." Speaking later on of growths resulting from injuries, he says:—"The explanation is probably this—that the blow produces a local inflammatory lesion or contusion, which forms a suitable nidus for the development of tubercular germs, which are already circulating through the system."

Now let us consider. We know that acute inflammation of the middle ear will give rise not only to the formation of pus within the cellular arrangement of the temporal bone, and so sometimes by a direct process of destruction to thrombosis of the lateral sinus, as may be seen in a very interesting specimen shown by Professor Allen; but it will give rise, without any intermediate course of destruction, to suppuration in almost any of the lobes of the brain, including the cerebellum. Now let us assume, for the sake of argument, the existence of an irritation acting upon an otherwise healthy brain, falling short of inducing suppuration, and continuing for any length of time, or being repeated as it would probably be in the case of chronic ear disease. What would be the effect? Quoting again from Byrom Bramwell's book, I find he says:—"Irritation of grey matter gives rise to symptoms, while destruction of grey matter is often unattended by any external manifestations" (page 9).

I am so thoroughly alive to my deficiency in the scientific knowledge of these obscure affections that, even at the risk of weariness, I must again quote from this author:—"Theoretically, a tumour or other 'coarse' lesion may cause discharge of motor grey matter, either by

'directly' irritating it, or indirectly (1) by interfering with the nutrient supply or (2) by reflexly irritating it. Further, Duret has shown that spasms and convulsions may be produced by irritating sensory nerves in the dura mater; but the spasms which are produced in this way have not the well-defined and characteristic features of the localised epileptiform convulsions due to irritation of the motor cortical centres."

Having considered these remarks, I would now point out a phenomenon presenting itself in the treatment of aural disease. It has occurred to myself more than once, and I have frequently seen it in the cliniques at home, that the simple act of syringing an ear, unprotected by an imperforate membrane, will produce symptoms varying from a slight dizziness to total insensibility. I would wish to say that, in the latter case, the water used was always, so far as my memory serves me, by inadvertence or ignorance--cold. However, there was no mistake about it—the patient dropped senseless on the floor. It not infrequently happens, even after the most careful syringing with water of a proper temperature, that the patient will complain of considerable giddiness; and this will be within the experience of all of those interested in this subject. How does this compare with the following case?

Case I.

On September 13, 1886, W. E. R., æt. 17, was brought to me by his father, a man in good position and extremely intelligent. He complained that his son had had a running from the left ear for many years, and had had various advice, but had never as yet consulted a specialist. The young fellow was a fine, strong, well-grown youth, and had no other ailment whatever. I syringed the ear, which contained much discharge, and on examining it found a small polypus; but as some water remained in the ear, its definition was not good. I therefore prepared, as is my custom, a probe armed with cotton wool to dry it, and proceeded to do this very gently and carefully; but immediately, I noticed a tremor pass through his frame, facial muscles twitching, and before I could interfere, he had fallen backward in strong epileptic convulsions. This seizure went through the ordinary phases, and in a short time he was recovered, feeling somewhat weak, but with an entire unconsciousness of all that had passed. The father was greatly alarmed, and assured me most positively that his son had never before had any symptoms of the kind; and as I have never seen the patient from that day to the present time, I have no doubt that the whole thing was put down to my credit, as will probably be any subsequent turn the disease may take.

Here we have an example of a condition distinctly epileptiform, following upon irritation of the peripheral ends of nerves in the tympanum. It is possible, however, that the case might bear another interpretation. We know from experience, that polypus in this situation is very generally associated with caries of the pars petrosa; and Ferrier's experiments have shown that the centres for the depressors and elevators of the mouth correspond nearly to this portion of the temporal bone. Assuming that in this case caries existed, direct irritation of these centres by the carious bone may have contributed to the production of the symptoms.

The next case I would offer you is more interesting, showing, as I think, the benefit derived from treatment.

Case II.

On June 23, 1888, I was consulted by L. S., a little girl æt. 13. She had a polypus, and considerable discharge from the left ear, this discharge having existed since she had had scarlet fever, at two years of age. It was for this condition that she was placed under my care; but as there was also some suspicion of mental disease, she was at the same time under the care of Dr. Grant, who considered her state as being anything but satisfactory, and feared development of mental trouble. She had curious ideas upon many points; had a habit of counting and repeating things a given number of times, and also was subject to fits of morose temper; altogether, a state which, as I said before, Dr. Grant feared might presage mental derangement of a more serious character, but which he said was also not infrequently found in the subjects of epileptic disease. The polypus was removed, and subsequent treatment lessened or nearly removed the discharge. Some months later, Dr. Grant had a letter from the friends, who lived in another Colony, saying that the little girl was very much better, the discharge from the ears had entirely disappeared, and the fits of temper were much less frequent, and more controllable.

Very shortly after this, that is to say—

Case III.

On July 30, I was called into consultation by Dr. Willmott, in the case of a little girl A. G., æt. 9, with the following history:—She had had discharge from both ears from the age of 2 or 3, following no particular illness; but during the last twelve months, the child had shown symptoms of what they feared was mania; and as it was particularly noticed that the paroxysms always followed increased discharge from the ears, while subsequently, and in the intervals, the ears appeared to discharge less, or not at all, the parents concluded that there was some connection between the ear trouble and the brain symptoms. With this history, I proceeded to examine the ears, and to do so, syringed them first with warm water. Almost immediately afterwards the child became violent, trying to get out of bed, and although easily restrained, was evidently labouring under intense mental excitement, writing furiously and aimlessly across a copy book. At the time, I gave it as my opinion that there must be some further mischief than would be accounted for by the ear disease; at the same time, I ordered such treatment as was suitable to arrest the sub-acute inflammation that was going on within the cavity of the tympanum. I heard some time afterwards, that under this, the discharge ceased; that the paroxysms became less frequent and severe, but still continued until some weeks ago, since when there have been no cerebral attacks. The following case, I think worth including here, as evidently bearing upon the connection between the ear and the brain, but being unaccompanied, so far as I could judge, by any active disease of the former organ.

Case IV.

On Sept. 6, 1888, Mrs. L. consulted me, complaining of deafness, from which she had suffered for two years, immediately following an attack of mumps. She had been under the treatment of other specialists, but had derived no benefit. It was just one of those cases where one may say, from certain indescribable features, the patient "looks" deaf, and one fears nerve injury. There was not much difference in the deafness of the ears, and I examined the left ear first, finding no local changes. I then examined the right ear, and though I could see the membrane partly, it was partly occluded by a small piece of wax, which I then proceeded to wipe away, as mentioned in a previous case, with a probe armed with cotton wool. This was easily done, causing only a momentary flinching, and the membrane was exposed to view, and found, as the other, apparently without change, but the patient complained of giddiness, and gradually became insensible and convulsed. From this state she recovered in the usual way, and then I heard for the first time, from herself and friend, that she was subject to these "fainting fits," which were always preceded by violent tinnitus, and that she suffered from frequent and severe headache.

The next and last case is perhaps on the whole the most interesting.

Case V.

C. C., æt. 20, consulted me on the 8th August, at the instigation of Dr. Bryant. His right ear had been discharging continually for thirteen years, following severe ear-aches. On the 1st Dec., 1884, he had an epileptic fit for the first time in his life ; another one seized him six months later, and after this he had been subject to fits regularly at intervals of never more than three weeks or a month, until he came to me. Early in 1886 he had a polypus removed from the left ear by Dr. Tremearne, of Creswick, and at this time he joined a rifle corps. Dr. Tremearne warned him that the firing was not good for him, and so he found, for after practice at the butts he frequently had epileptic fits, with a distinct aura, so that he was forewarned some two or three minutes, during which he made preparation. I have seen him from time to time, the last time being on Dec. 3, 1888. Under treatment the discharge from the ear has almost ceased, and he has had no fit since August 7 (*i.e.*, a period of nearly four months), and feels much stronger and better in his general health. Beyond the local treatment, I have been giving him strychnia and bromide of potassium, but I may mention that he had taken considerable courses of bromides before he came under my care.

Now here is a group of cases, all coming under the observation of one practitioner within a short period, in which chronic disease of the middle ear existed in conjunction with epileptic or epileptiform conditions—that is, with the exception of Case IV. The continued irritation produced by this sub-acute inflammation of the middle ear would seem to be all that can be desired to establish the connection between the symptoms, and would comply with all the requirements of this form of brain disease. As time goes on, fresh observations in this field will no doubt correct or verify these statements, but at any rate

they are sufficient to demand the investigation of the subject from those who have the opportunity of watching these cases, for it must be remembered that in practices such as mine it is only those cases in which the ear symptoms are the most urgent that epilepsy comes under observation, and I therefore anticipate that my function chiefly lies in directing the attention of medical men generally to the advisability, in all cases of epilepsy, of searching out any history of ear disease, even if such be not immediately presenting, and especially to consider the serious necessity of attending to chronic otorrhœa wherever found.

THE VALUE OF REDNESS OF THE HANDLE OF THE MALLEUS AS A SYMPTOM IN DISEASES OF THE MIDDLE EAR.

By James W. Barrett, M.D., M.S., F.R.C.S. Eng.

Assistant Surgeon to the Victorian Eye and Ear Hospital, and Demonstrator and Examiner in Physiology in the University of Melbourne.

I have been unable to obtain precise information as to the value of redness of the handle of the malleus (seen through the auditory meatus), as a symptom in diseases of the middle ear. I had been told that it sometimes co-existed with perfect hearing power, and with a healthy tympanum, and was not of necessity a pathological appearance. The object of the investigation I have made was to determine whether redness of the malleus, seen on examination of the membrane, is, or is not, a pathological appearance in all cases.

(*a*) The first step taken was to examine a large number of membranes, in persons whose hearing was perfect, and in whom there was no middle ear disease existent. In none of these examinations (over fifty in number), did I find a membrane with a red malleus. In all, it was white in colour.

It is well known, that syringing the ear, or the impact of a blast of cold air, produces a redness of the malleus, which usually passes off in a few hours. Temporary redness from the first cause, I have seen frequently; from the second, once or twice.

(*b*) Next I made careful examinations of those cases in which the malleus was red, and, when possible, kept them under observation.

The following table gives particulars of fifteen of the cases. By way of preface, I may say that a healthy adult, 25 years of age, usually hears the watch I employ at about 100 inches distant. Healthy persons over 50 years of age hear it at distances varying from thirty-six inches to nil. Old persons, hearing it at one inch or less, often possess perfect hearing power for conversation. My observations are not yet complete, but I do not think the acuteness of the hearing for the watch diminishes greatly till at least the 40th year is reached. Where the redness was well marked, the malleus is referred to as being red. Where it was not well marked, the colour is described as reddish.

No.	Age of Patient.	Duration of Ear Disease.	Nature of Disease.	Distance at which Watch was heard.	Appearance of Malleus.	Appearance Subsequent to Treatment.
1	29	2 years	Chronic catarrh, middle ear	Right, 2 inches Left, 3 inches	Both mallei red	After one month's treatment—Hearing, right, 10 in.; left, 5 in.; mallei pale.
2	16	4 days	Acute catarrh, middle ear (caused by applying whiskey)	Right, 4 inches Left, 1 inch	Both mallei and membranes red	After one month's treatment—Hearing, right, 4 feet; left, 4 feet; mallei and membranes normal.
3	24	6 months	Cerumen	Right, 1 inch Left, 3 feet	——	Cerumen removed; mallei red for twenty-four hours.
4	17	14 years	Chronic catarrh, middle ear (struma)	Right, 3 inches Left, 8 inches	Both mallei red	After seven days—Hearing, right, 8 feet; left, 8 feet; mallei pale.
5	8	1 year	Chronic catarrh, middle ear	Right, contact Left, contact	Both mallei reddish	——
6	34	7 years	Chronic catarrh, middle ear	Right, contact Left, contact	Both mallei reddish	——
7	26	—	Chronic catarrh, middle ear	Right, 4 feet Left, 3 feet	Both mallei red	——
8	29	5 years	Chronic catarrh, middle ear, and Eustachian obstruction	Right, $\frac{1}{2}$ inch Left, $\frac{1}{2}$ inch	Mallei red	——
9	63	2 years	Cerumen	——	——	Cerumen removed—Hearing, right, $\frac{1}{2}$ inch; left, $\frac{1}{4}$ inch; redness of mallei. After some weeks—Hearing, right, 1 inch; left, $\frac{1}{4}$ inch; mallei pale.
10	23	12 years	Chronic catarrh, middle ear	Right, 2 feet	Malleus red	——
11	26	8 months	Chronic catarrh, middle ear	Left, 2 inches	Malleus red	——
12	25	1 week (?)	Cerumen and subacute catarrh, middle ear	Left, 5 inches	——	After removal—Hearing, 3 feet. In a few weeks redness disappeared.
13	54	Many years	Chronic catarrh, middle ear	Right, contact	Malleus red	——
14	24	8 days	Acute catarrh, middle ear	Right, contact	Redness of malleus and distortion of membrane	After three weeks' treatment—Hearing, right, many feet; membrane normal; malleus pale.
15	22	14 days	Acute catarrh, middle ear	Right, 2 feet	Redness of malleus and distortion of membrane	After one month's treatment—Hearing, 10 feet; malleus pale; membrane normal.

An examination of the cases recorded show :—(1) That in all cases the red appearance was co-existent with deficient hearing power. (2) That in cases 1, 2, 4, 14, and 15 (cases which were kept under observation), improvement in hearing was coincident with disappearance of the redness. It seems to me that these observations warrant the conclusion that the redness is indicative of an inflammatory condition of the tympanum, which reduces the hearing power, and that it is distinctly a pathological sign.

Case 1 furnishes a type to which attention must be called. There had been for two years positively, and probably for a much longer time, chronic inflammation of the middle ear, which had steadily reduced the hearing power. On the disappearance of the redness under treatment, the hearing improved from two to ten inches right, and from three to five inches left—a considerable improvement. But yet this result was poor. That is to say, the previous attacks had reduced the hearing to about ten inches right and five inches left. The redness was due to an additional attack of inflammation, from which the ear recovered.

The table shows that redness is a hopeful sign to some extent. When the malleus appears red, the hearing power may generally be somewhat improved.

PHLYCTENULAR CONJUNCTIVITIS IN ERYTHEMA NODOSUM.

By Leonard W. Bickle, L.R.C.P., M.R.C.S., Mount Barker, South Australia.

At the July meeting of the South Australian Branch of the British Medical Association, I read a short paper detailing the features of nine cases of erythema nodosum which had occurred in my practice since January 1884. In seven of these a condition of phlyctenular conjunctivitis was noticed, a number far too great to be a mere coincidence. Almost immediately after this paper was read, I met with a tenth case in a married woman, who had, in addition to the E. nodes on the leg, a well-marked erythema papulatum of the forearms, the rash being perfectly typical. In this case the same eye condition cropped up, and I was glad to avail myself of the services of a lady artist, resident in the town, to sketch the condition. This sketch I now show, as it leaves no doubt as to the nature of the affection. It is not a little curious that the symptom has not been noticed in South Australia as far as I can ascertain, and also, that it should occur in eight out of ten cases.

Is the affection of E. nod. commoner out here than in the old world? The proportion of cases to those of general skin disease is infinitely greater in my experience than that shown by McCall Anderson's and the American Dermatological Association's statistics, and yet rheumatism is undoubtedly rarer in Australia than in the older countries.

The symptom is an interesting rather than an important one, and presented no difficulties in treatment, the dusting in of calomel, and

a weak tonic lotion, causing a cure in a few days. It took place in patients of all ages, from ten years to sixty years. The time of appearance varied, in some cases coming with, in others later than, the rash.

EXHIBITS.

Dr. Lindo Ferguson, F.R.C.S., of Dunedin, N.Z., exhibited the following specimens :—

(*a*) Aspergillus niger.

(*b*) Instrument.—A two-edged scissors for dividing the capsule.

NASAL CALCULUS FROM A GIRL AGED TEN YEARS.

By C. Morton Anderson, M.R.C.S. Eng., Sydenham, Christchurch, N.Z.

This patient was brought to me on Sept. 17, 1887. She was then suffering from an exceedingly offensive purulent discharge from the right nostril, which she had had for about one year. She was thin and pale, had a bad appetite, and was in very bad health. Up till a year previous, she had enjoyed good health and spirits. I learned that she had been under medical treatment for about nine months, but apparently with no benefit. It was absolutely impossible to examine the nostril carefully, owing to the excessive quantity and thick tenacious character of the discharge. I ordered a mixture of syrup of iodide of iron with calumba, and a lotion (boric acid, gr. x in ℥j) to syringe the nostril out with frequently. On Oct. 3, as the discharge had not improved so much as I had hoped for, I ordered the following lotion :—℞. acid carbolic, ʒj ss ; acid tannic, gr. xij ; glycerini, ℥j ; aq. ad. ℥xij, m. ft. lotio.

Oct. 11.—The discharge was somewhat less copious, and not so offensive, but I still could not make a satisfactory examination. I then prescribed a mixture of liq. arsenicalis and dec. cinchonæ.

Nov. 5.—Considerable improvement in discharge and general health.

Nov. 8.—Fancied the disease was located in inferior spongy bone. Mopped this over with equal parts of carbolic acid and glycerine.

This was repeated on the 12th, 15th, 21st and 24th Nov. On the last occasion I felt certain that I could feel some dead bone at the posterior border of the inferior spongy bone, and on firm pressure with a probe it appeared to move slightly. I then told the girl to come on Nov. 26th to have this removed, and that I would give her chloroform, as the nose was exquisitely sensitive, and a strong solution of cocaine seemed to have very little influence.

I might here remark that, on the first occasion that the girl was brought to me, I had inquired most particularly as to whether she had

ever put anything up her nose, such as a pebble, a cherry or plum stone, &c. But the child was quite positive on this point that she had not, and she seemed so clear and intelligent, that I accepted her denial.

Nov. 26.—Chloroform having been administered, I proceeded to remove, if possible, this supposed piece of dead bone; and after some difficulty, and the exercise of a considerable degree of force, I succeeded in removing the desired object, which, on further examination, proved to be a nasal calculus, with a cherry stone for a nucleus. After this, the discharge soon ceased, and the girl regained her usual health and spirits.

I have been induced to exhibit this specimen principally on account of the rarity of nasal calculus, but also partly on account of some other important features in the case.

In the first place, the amount of constitutional disturbance was very great, and although, no doubt, this had been carefully treated, still she continued to go from bad to worse, till the local lesion was taken in hand.

Secondly, the girl denied having ever put a cherry stone up her nose; and this I am inclined to believe, as from the formation of her nose, and the great difficulty I experienced in removing the object, I do not believe she could have put one there *in situ* had she tried. Then how did it get there? The theory which appears to me most feasible is, that about a year ago, when eating some cherries, she must have coughed, or more probably sneezed, and that this effort had forced a cherry stone (which she was probably trying to swallow) up into her right nostril, and fixed it firmly at the posterior part of the inferior spongy bone. Here it remained, and in due time the calcareous concretion formed on it.

The child's mother informed me that, at the outset, the girl used to complain of pain in her nose, and denied having put anything into it, but that they had not sought medical advice for a few weeks, till the offensive discharge appeared and the health began to fail.

Possibly, some will recollect having been overtaken with a fit of sneezing when in the act of swallowing; and if such has been accompanied with a piece of potato or bread crumb being driven up into the nares, they will probably have a lively recollection of the trouble they had to get it down again.

MICROSCOPIC SPECIMENS OF GLIOMA OF RETINA.

From C. Morton Anderson, M.R.C.S. Eng., Sydenham, Christchurch, New Zealand.

No. 1.—Portion of glioma of left eye from Mrs. S.'s infant.
No. 2.—Portion of glioma of right eye from Mrs. S.'s infant.
No. 3.—Complete section of left eye from Mrs. S.'s infant.
Nos. 4, 5 and 6.—Sections of right eye of Albert H. H.

Sections 1, 2 and 3 were prepared for me by Dr. T. L. Bancroft when he was House Surgeon at the Christchurch Hospital.

No. 2, from the right eye. This globe was first noticed to be diseased when the child was 32 days old, and I excised it on the 35th day (from birth). The left eye at that time was apparently healthy, and a careful examination with the ophthalmoscope failed to reveal any trace of disease. The child made a rapid recovery from the operation, without a single bad symptom. Date of operation, November 7, 1887.

On November 30, I was again called in to see the child to examine its left eye, as the parents thought they detected a yellowish reflex. Examination showed that their fears were only too well founded, but I declined to operate on this eye without a second opinion as to the desirableness of so doing.

Accordingly, on December 7, Dr. H. Lindo Ferguson, of Dunedin, was consulted, and he corroborated my diagnosis, and advised the operation as the only chance of saving the child's life, and also to save it from the great pain it would suffer if the disease were left to run its course. The parents then decided to try what "faith healing" would do, but after several days, as the eye grew steadily worse, they made up their minds to have the operation performed; and on December 17, I excised the (left) eye, at the same time removing about half-an-inch of the optic nerve behind the globe, together with some of the surrounding tissues. The child recovered almost as rapidly from this operation as from the first.

Some months afterwards, the child had one convulsion, but it was then teething, and had been given some plum cake by one of the other children. A warm bath and some castor oil soon restored it, and up to the present time (November 1, 1888), the child has been remarkably healthy, and both sockets look as well as could be wished.

Family History.—Both parents are pale and delicate, and they are cousins. All the children, with the exception of this baby, show evidences of struma. One boy has had hip joint disease, but has recovered with shortening of the leg. Two children have died of tabes mesenterica. There is no evidence whatever of syphilis, and no previous history of consumption on either side of the family so far as I have been able to discover. One aunt on the mother's side suffers from some mental affection, and Mrs. S. has shown some symptoms of the same after two of her confinements. No history of any eye affections in family.

Sections 4, 5, and 6.—Albert H. H., aged 11 months. I first saw this child on August 25, 1888, and excised the globe (right eye) on the following day. The child was a very fine healthy boy, and made a quick recovery. When I last saw him in the early part of October, the socket looked healthy, and otherwise he appeared to be in vigorous health, and of a remarkably cheerful disposition. I regret that I could not obtain any history in this case. The child is, I believe, an illegitimate one, and has been put out to be nursed. I only saw the mother once for a few minutes before the operation, and she appeared to be a fine healthy young woman.

ON THE NATURE AND CAUSES OF DIPHTHERIA AND ITS RELATION TO CROUP.

By JAMES JAMIESON, M.D.

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Few subjects in practical medicine have greater interest and importance than that of diphtheria. Various causes, and especially the occurrence of rather severe outbreaks in different parts of this colony, have given it a special interest at the present time. It has been thought desirable, therefore, that any discussion which may arise should have point given to it by a preliminary statement, with reference to some points in connection with the nature and cause of the disease, and its relation to croup. It must not be said that questions of this kind are of merely theoretical interest, since it cannot fail to be the case that a man's views as to treatment, and the definiteness and thoroughness with which he carries it out, will depend greatly on the opinions he holds about the nature of the disease. If he believes it to be primarily a local disease, he will inevitably lay great stress on the use of local remedies; and even in his choice of these, he cannot fail to be influenced by his pathological opinions. If his pathology is bad, his treatment will also be bad, or at best, tainted with uncertainty; and most of us, who have had experience of the disease, must be convinced that it is one in the management of which active measures are called for. No apology is therefore needed for an attempt, however imperfect, to state some points which I believe to be of fundamental importance.

So far as published records show, the first cases of diphtheria, observed in Victoria, occurred in the end of 1858, and cases were reported from Tasmania about the same time. The disease spread rapidly, so that in 1859 the deaths registered as caused by diphtheria and croup numbered 509, and in 1860 no fewer than 792—a higher mortality than has been observed in any year since. In grouping together the deaths registered as due respectively to diphtheria and croup, I by no means wish to prejudge the question about the identity or dissimilarity of the two affections. I only wish thus to indicate that, to get a correct notion of the mortality from diphtheria, it is necessary to take account of the deaths from croup, since everyone admits that many, if not most, fatal cases of croup are instances of diphtheria affecting the larynx.

There need be no hesitation in saying, that all authorities are now agreed in holding that diphtheria belongs to the class of infective diseases, owing its origin to the introduction into the system of some virus. I think it may be taken as further agreed, that this virus is not only possessed of specific properties, but that it owes its activity to the presence of bacterial organisms, even though there is not yet satisfactory evidence that the particular bacterial form has been identified. But, in addition to being infective, there is clear proof that diphtheria is a contagious disease, spreading from person to person, either directly by personal intercourse, or indirectly, as by the agency of infected rooms, or articles of food, clothing, or furniture. Of course

there are very many cases in which it is difficult, if not impossible, to trace the source of contagion, and the same difficulty is often found in tracing the mode of origin of cases of other diseases whose infectious or contagious nature is undoubted, such as measles or scarlatina. But that diphtheria spreads by contagion is shown, not merely by its extension from one member of a family to another, but even more clearly by the not uncommon instances of medical men having become infected by the throat discharges of patients on whom they were attending.

While there is thus clear enough proof, then, that the disease may and does spread from person to person, it must also be allowed that the cases are very numerous, in which it is hard to believe that there could have been conveyance of the virus from a previous case. It is necessary, I think, to admit that the poison finds a lodgment, and probably a breeding place, in foul heaps, neglected drains, cesspits, &c.

As regards its mode of spread, indeed, diphtheria seems to have many points of resemblance to typhoid, in which some outside source of infection has often to be assumed, whatever we may think about its specific nature. Speaking from my experience of the disease, both in town and country, I can say that I have been often strongly impressed with the influence of local conditions, of the kinds referred to, in favouring the spread of diphtheria in a locality. That insanitary conditions are not necessary for its admission into a locality, and its spread through the members of a family, is doubtless true. But that such conditions favour its spread in many cases, must at the same time be admitted, though we are not yet in a position to explain the exact mode of operation. That sore throat, not distinctly diphtheritic, is often caused by sewer emanations, is a matter of common observation; and the possibility is that the poison which causes common ulcerative sore throat may undergo some process of intensification, whereby it becomes capable of producing the more serious disease, which is then transmissible directly from person to person. But till we have a fuller knowledge of the essential constituent of the virus, it will not be possible to speak more definitely. We do know that the specific virus is very persistent, and that it may remain long attached to clothing, articles of furniture, and even walls of buildings, while still remaining capable of exciting the disease in susceptible subjects; and this should always be borne in mind, before we dismiss the possibility of contagion in any particular case.

Whether any special susceptibility, local or general, is necessary, may perhaps be doubtful; but the data collected by Hirsch ("Handbook of Geographical and Historical Pathology," vol. iii, p. 100) go to show that the disease is most prevalent in cold, damp weather, though there are many marked exceptions to the rule. The most reasonable supposition is that the influence of cold and damp, and of changes of weather generally, in favouring the occurrence of diphtheria, is due to their liability to produce sore throat of a catarrhal kind, thus allowing a readier inlet for the specific poison. That susceptibility of some kind, and probably local, is of importance, is strongly suggested by the frequency of instances in which only one member of a family suffers, as compared with what happens when measles or scarlet fever finds admission into a house.

A question more difficult, but not less important than these etiological ones, is that about the relation between the local and constitutional symptoms; whether, that is to say, diphtheria is or is not primarily a local disease. To put it otherwise, the great dispute is whether we are to look on the throat affection as a mere localisation of the effects of the poison (like the angina of scarlet fever), or to regard it as the first stage of the whole process—the constitutional symptoms, and the affections of remote parts, being secondary results in some way of that local affection. Now, while I have no wish to ignore the difficulty of the question, and am free to admit that the opposite view has some evidence in its favour, I am unhesitatingly of opinion that the doctrine of the local nature of the disease primarily is the true one, and that which is best in accord with the history and course of the disease, and with the results of treatment. The first point in favour of this doctrine is that, in patients who can differentiate their symptoms, the first thing usually complained of is more or less sore throat. The throat affection need not, to begin with, be severe, and hence in children it is readily overlooked; but in the case of adults, it will always be found, I think, that some pricking or slight difficulty of deglutition is experienced, before any other symptoms have become developed. It is true that in scarlatina the sore throat is also a very early symptom, but at the same time I doubt if anyone could say that it ever comes on before the rigor, feverishness, headache, vomiting, or other signs of constitutional implication in that disease, while in diphtheria this is not uncommon. And there are a good many mild cases of diphtheria in which there never are marked constitutional symptoms at all.

Even more conclusive are the cases, not of course common, in which the disease begins in some other locality than the throat, as the result of inoculation. The following cases ("Memoirs on Diphtheria." N. Syd. Soc. Trans., pp. 181-84) give the strongest possible support to the view that the disease is primarily a local one:—(1) Dr. Herpin was treating a child by means of cauterizations, when some coughed-up matter was thrown on the orifice of his left nostril, and was not at the time washed or wiped off. A few days after there was snuffling on the left side, and nasal voice; then suddenly painful pharyngeal angina, the tonsils and uvula being found next morning completely enveloped in a white incrustation of false membrane. There was slow recovery, with development of marked paralytic symptoms. (2) In a school, a large number of children were attacked with diphtheria in the ordinary form. One child, suffering from excoriated chilblains, who was allowed to mingle with the others, wetted one of its feet in a little pool of sputa on the floor, and in it an excessively painful ulceration between the toes, and covered with false membrane, was the result. (3) Trousseau (loc. cit. p. 261) relates the case of a child suffering from fatal diphtheritic sore throat, whose mother suckled it all through its illness, with the effect that her breast was soon afterwards attacked with the specific inflammation, and became covered with false membranes. Many cases of such localisation, as the result of inoculation, might be collected, and others, indeed, will be referred to further on.

Another point, which seems to me to tell in favour of the primarily local nature of diphtheria, is the shortness of the incubation period,

in cases where its duration can be clearly ascertained. It is commonly put by authorities at two to five days, but it certainly is often even less than the shorter of these periods. The following are very interesting illustrations of this fact: The first case came under my own observation some years ago, when I was in practice in a country town in this colony. Two children came in to church, from an isolated house about a mile from the town, and went for a short time to a house to see the body of another child which had died of diphtheria, there being other cases under treatment there at the same time. The same night, after returning home, one of these two children was taken ill, and died of the disease a few days after. Knowing all the particulars as I did, there seemed to me to be no room for doubt as to where and when the contagion had been acquired. The other case is that of the late Prof. C. O. Weber, of Heidelberg, as told by himself ("Pitha and Billroth's Chirurgie," Bd. I, p. 398) in the following terms:—"On April 23, 1864, I performed tracheotomy, though too late, on account of croup, in a boy of four years. As the child vomited during the operation from an emetic which had previously been given, blood passed through the canula into the trachea. To prevent the danger of suffocation, I sucked out the blood with my mouth, and naturally got with it in my mouth some of the croup membrane, mixed with mucus and pus. Though I immediately washed it out with vinegar, on the evening of the same day I felt pain on swallowing. Severe angina came on, which a few days after passed on to violent croupous inflammation of the larynx. The fact that there had been contagion was confirmed by the circumstance that my assistant, Dr. A. Meers, also acquired a sore throat, which, however, passed off more easily." It is very remarkable that three or four years after, Prof. Weber again acquired diphtheria in exactly the same way, and died of the effects; two assistants who helped him in the operation, and also tried to suck the tracheotomy tube, being likewise affected.

The following extract from "Trousseau's Clinical Lectures" (N. Syd. Soc. Translation, vol. ii, p. 497) illustrates not only the risk of contagion, but the liability to a very rapid course:—"Very recently, one of my provincial colleagues had a case of diphtheria and croup in which he was obliged to resort to tracheotomy. During the operation, a fear of suffocation arose, from blood getting into the trachea, whereupon, in dismay, my imprudent colleague applied his mouth to the wound in the neck, to suck out the blood from the air passage; he inoculated himself with the disease. Like Valleix, he died in forty-eight hours of malignant sore throat." It is needless to insist on the absolute proof, which these cases supply, not only of the contagiousness—the actual inoculability—of the disease, but also of the rapidity with which the symptoms, and above all, the local symptoms, become manifest. Now it is this which marks the difference between diphtheria and the general diseases, of which scarlet fever may be taken as the type. In that disease the incubation period may be taken as lasting four to seven days, or possibly longer, and in measles perhaps seven to ten days. The difference is not owing to different modes of production, because, when these diseases have been imparted by inoculation the period elapsing before the development of distinct symptoms was found to be also about seven days. I am aware that it has been stated that

the incubation period of scarlatina may not be more than twenty-four or thirty-six hours, but the evidence is distinctly meagre, the case narrated by Trousseau ("Lectures," vol. ii, p. 163) being constantly referred to. Trousseau himself says that the duration of the period of incubation in scarlatina cannot be rigorously determined; and certainly there is liability to fallacy in determining it, which prevents the few published cases of very short incubation from having anything of the demonstrative character of those of diphtheria just quoted.* So far as we have gone, therefore, it does not appear as if, in our search for diseases with which to class diphtheria, we should find them in the group of the acute exanthemata.

But I think the argument may be developed a little further; and for that purpose, the course of an ordinary case of diphtheria has to be considered. When the throat is examined at an early enough stage, there may readily be seen, with perhaps some diffuse redness, merely a small white patch on one tonsil. This slowly increases in size, so that twenty-four or thirty-six hours may elapse before it begins to transgress on the soft palate, or before anything of a similar kind can be seen on the other tonsil. Several days may easily elapse before symptoms of croup develop, showing that the disease has spread to the larynx. All this time the false membrane, as it extends, may be seen to have a distinct well-defined margin. This is altogether a different process from that observed in the angina of scarlet fever, where there is uniform diffusion of the inflammation from the first, and symmetrical formation, with rapid and uniform development of membrane formation, when there is such formation at all. If there is to be comparison of diphtheria with other diseases at all, the resemblance would rather be to the progressive development of a disease like erysipelas, which has taken origin in, and extends from, some breach of surface on which the virus has been inoculated accidentally or for experimental purposes; or with hospital gangrene, or other phagædenic process, affecting a wound or ulcer. I cannot help thinking that this want of symmetry in the first localisation of the diphtheritic process in the throat, with its continuous extension, in a widening circle, from the first observed seat, is the strongest evidence in favour of the disease being at the outset of a strictly local nature.

But if it be held, as I do hold, that the constitutional symptoms and the affections of remote organs are secondary to, and results of, the local process set up by the implantation of the virus, and the changes produced by it at the seat of implantation, I may be asked to account for those cases in which severe constitutional symptoms are observed before the throat symptoms have become marked; or for those in which it has been alleged that fatal general symptoms, such as heart failure, came on rapidly without any sore throat at all. It certainly is not very uncommon for croup to come on and prove fatal, in cases where no affection of the tonsils, fauces, or pharynx is observed. In most of these latter cases it is certain, I think, that there had been some faucial affection at an early period, which disappeared spontaneously, or under the influence of treatment; and this, indeed, has often

* The fullest discussion of this question of the incubation period of scarlet fever, which I have met with, is contained in the article on that subject in Pepper's "System of Medicine," by American authors, vol. 1.

been noted. But if it is insisted that death from constitutional symptoms, such as collapse, comes on in cases where there is no local diphtheritic process at all, I can only say that I have never observed any cases of the kind; and a very careful post-mortem examination would be required to prove that false membrane was absent, not only on parts easily seen, but in the recesses and deep parts of the naso-pharynx, or on some other mucous surface.

It must be admitted, of course, that constitutional symptoms of the severest kind may occur in cases where the local symptoms were slight, and that albuminuria not infrequently is found early in the course of the disease. The explanation may be that, in some cases—as, for instance, where the disease took origin on a raw surface—absorption of poison may take place quickly; and it may easily be the case that it is absorbed from the lining of the lacunæ of the tonsils, at a time when little is to be seen on the surface. There can be little doubt, I think, that severe constitutional symptoms may have a double origin, and be due either to admission of the specific virus into the system, or to the absorption of putrefactive products from the seat of the local lesion. These two modes of systemic infection may, of course, be combined in varying measure; but it certainly is matter of observation, that severe constitutional symptoms of any kind come on, as a rule, about the height of the local affection, and are in proportion to its intensity. If there is an explanation to be got of the more or less anomalous cases already referred to, which are certainly rare, it should be sought in some hastening, or other modification, of the ordinary sequence of events, rather than in the assumption of some quite different course.

One more point in connection with the pathology of diphtheria, which is in favour of its primarily local nature, is that an attack does not give protection from subsequent ones, thus further emphasising the differences between it and the acute exanthemata.

I venture, further, to say that the results of treatment are distinctly in favour of the view, that diphtheria is primarily a local disease. Every one who has given fair and full trial to the system of treatment with antiseptic and disinfectant agents, must have seen cases cut short in a way that gave complete contradiction to the doctrine that throat affection is a mere manifestation of a general constitutional condition, like the angina of scarlet fever. I do not propose to enter on details of treatment, but after trial of many methods, I am clear on the subject of the benefits to be got from local treatment of the kind mentioned, with the proviso, that it must be carried out in an efficient way; and efficiency means, above all, persistence with the use of the remedy selected, carbolic acid, or another, using it in moderate strength, and at short intervals, and in a way to cause the minimum of mechanical injury to the parts, *i.e.*, by insufflation, or spraying, rather than by rougher modes of cauterisation. And it is in this that the great importance of correct views of the nature of the disease lies; for no man will carry out, in other than a half hearted way, a system of local treatment for a lesion, which he looks on as little more than a manifestation of a general disorder, or at most a troublesome symptom, to be palliated perhaps by the swallowing of ice, or the application of hot or cold packs to the neck.

There is another point in connection with diphtheria which deserves discussion, and that is its relation to croup, in its true or membranous form. Since Bretonneau, nearly all the leading physicians of France have held to the identity of the two affections. More recently, the same view has been steadily gaining acceptance both in Great Britain and Germany, and is now, I think, generally held. With all who yield deference to authority in such matters, it cannot fail to have great weight, that Sir William Jenner, who formerly considered membranous croup to be a distinct form of disease, has now formally withdrawn that opinion. It is admitted at all hands, that diphtheria frequently proves fatal by extending to the larynx; and even those who deny the identity of the two affections not only allow this, but admit further, that it is not possible to distinguish, with anything like certainty in the individual case, the croup which is diphtheritic, from that form which has been called idiopathic, but is now by preference known as sporadic membranous croup. While pathologists distinguish in the anatomical way between the "diphtheritic" and the "croupous" membranes, they all allow that both forms may be met with in the same case of diphtheria, though the former is especially seated in the fauces or pharynx, and the latter on the mucous surface of the respiratory tract. And further, it is certain that no evidence has ever been supplied, showing that the membrane found in the larynx is different, in the croup due to the extension of faucial diphtheria, from that which is found in supposed idiopathic croup. Basing an opinion on my own observation and experience, I am strongly inclined to adopt the doctrine of the identity of the two affections, and practically, it certainly is the safer view to hold, either from the point of view of prevention or treatment. As an article of faith then, I favour the identity doctrine, but I am not prepared to assert it dogmatically, and these are some of the grounds which compel me to hesitate a little.

Diphtheria, as we are all familiar with it, was not recognised in this colony till the end of 1858, in which year it was reported to have caused 6 deaths; the number increasing to 280 in 1859, and to 636 in 1860. But, from the time when accurate returns were kept, there were always deaths registered as due to croup—72 in 1854, 53 in 1855, 69 in 1856, and 56 in 1857. With the appearance of epidemic diphtheria, the deaths from croup of course rapidly increased to 102 in 1858, 229 in 1859, and 156 in 1860. What was the nature of this disease called "croup," which caused 72 deaths in the year 1854, when the population of the country was less than one-third of what it is now, and the number of births less than one-fourth? In fact, in proportion to population, more deaths were ascribed to croup in 1854 than in any year from 1880 to 1886, when many were certainly of diphtheritic origin. Is it conceivable that, during the years 1853 to 1857, diphtheria was actually a common disease, but that for some mysterious reason it was not recognised, though from 1858 onward there was no difficulty experienced in its diagnosis? If this be the case, however, then the disease must have shown a very special predilection for the respiratory surface, and it can never have been very prevalent in any one place. Of course it is now known that there had been local outbreaks of malignant sore throat in Great Britain previous to 1857, though the disease took on the epidemic form, and was generally recognised, only in that year. This may be true of this colony also, for during the years 1854–58

scarlatina was more or less prevalent, and deaths really due to diphtheria may have been ascribed to it. There is perhaps confirmation of the same view in the circumstance that, in the same years, a good many deaths were registered as due to "quinsy," which is not recognised as at all a fatal disease now. The number was not absolutely, though it was relatively, great—53 deaths from "quinsy" being registered in the 5 years 1854–58, as against 51 in the 5 years 1882–86. I do not think it is possible, in the present state of our knowledge, to give a positive answer to the question, "Is croup always merely diphtheria affecting the upper part of the air passages," the evidence derived respectively from clinical observation, pathological anatomy, and vital statistics, being of a rather inconclusive kind. But at the same time I must repeat my own opinion that croup, as we see it now, in its true membranous and fatal form, is almost always a diphtheritic affection. I have seen a good many cases, and I am not sure that there was one of them, which I had not grounds for considering to be of that nature. And it is important, in my opinion, that this view should be held; for, just as experience has convinced me that local treatment of an energetic kind can alone be relied on in faucial diphtheria, so I am convinced that treatment of a similar kind is most useful in croup, though for manifest reasons it can never be depended on to be so successful.

NOTES ON DIPHTHERIA.

By Dr. A. Jarvie Hood, Maclean, Clarence River, N.S.W.

During the last four years, we have had an epidemic annually, each one occurring about the same time of the year, viz., during the months of April and May, and a few cases in June. It has been my lot to attend seventy-five cases during those epidemics, and I purpose to give a short *resumé* of those cases, giving special reference to etiology and treatment.

Etiology.

(1) *Dampness and bad ventilation*

Is usually mentioned as a prime factor, but that could not possibly obtain in the epidemics I refer to, as three of them occurred in times of great drought, while the other occurred in anything but a wet season; moreover, the ventilation was only too thorough, most of the houses being built of timber, which, shrinking within a few months after being put up, left a series of air-passages, in some instances large enough to blow out a candle at a few yards' distance. In one island in the river, diphtheria is endemic, and in one house alone it recurred thrice in three years.

(2 *Insufficient feeding and clothing.*

Bad feeding and poor clothing had no share in the causation, for in only one or two cases were the patients in anything like poor circumstances, and strange to say, no deaths occurred in the members of those

families so circumstanced. Almost without exception all the cases happened in well-to-do farmers' houses, where fresh food, including eggs, milk, butter, meat, &c., were in abundance.

(3) *Diathesis and occurrence during or after diseases of other nature.*

A fair number occurred in tubercular families, and one case occurred in a patient suffering from chronic phthisis, with a fatal termination. Out of eleven deaths, five occurred in families of distinctly tubercular inclination, viz., in whose families deaths had occurred from phthisis or tubercular meningitis.

Two cases followed an attack of frequently recurring spasmodic croup, both being fatal. One case occurred immediately after an attack of scarlatinal albuminuria, and, strange to say, recovered. About 10 per cent. of the cases occurred in children who had enlarged tonsils following quinsy, which I may state is endemic in some parts of this district, and almost identically the places where diphtheria is so bad. One case occurred during an attack of whooping cough, with recovery. The remainder occurred without reference to other diseases.

(4) *Age.*

Age as a factor was most peculiar. Whilst the usual age is stated as some time between 2 and 10 years (with of course exceptions), the cases I now refer to differ very much in their ages. Two cases occurred in infants under 6 months; three between the ages of 6 and 12 months; six between 12 and 24 months; twenty-one between 2 and 4 years; twenty-seven between 4 and 10 years; six between 10 and 20 years; one at 21; two at 23; one each at 26, 30, 36, 37, 39, 40, 54 (?). This differs considerably from the usual ages given. Of these, five were suckling, which is a somewhat rare occurrence; and although we hear occasionally of cases occurring in adults, and sometimes with a fatal issue, as evidenced by the sad and sudden death of Dr. H. M'Ewan, of Glasgow, one of the most promising members of the profession, which took place a few months ago, it is somewhat rare, whereas in my cases there were thirteen out of seventy-five above the age of 15, and ten over 20.

(5) *Locality.*

As the last of the probable causes, and to me the most important one in this instance, I will mention locality.

As a few of you may know, the district of the Lower Clarence lies in a low basin, with mangrove-lined creeks and low banks. The shores are very sloping, and covered with mud and decaying and decayed vegetable matter, forming a suitable nidus for the luxuriant growth of the mangrove. The river is studded with islands (99), many of which are inhabited and cultivated, but which, in their interior, are often below tide level, consequently they contain swamps of brackish water which, in many instances, is simply river water filtered through a medium of mud and dead organic matter.

The chief supply of drinking water is obtained from wells, dug in many instances in close proximity to these swamps, and the result is that the people are drinking, especially in dry weather, poisonous

matter in varying, but probably large, quantities. Added to this, the banks, which are low and muddy, as before stated, are left uncovered while the tide is low, and as the tide is influenced on the river to a great extent by the rainfall, during the drought there is of course a much greater tract of bank exposed, and necessarily, the poisonous emanations being greater, the malarial effects are greatly increased. The epidemics were of varying degrees of virulence, the last two being by far the worst, both as to fatality and the number of adults affected, and it is worthy of notice that both the seasons were very dry. The disease recurred in one family in three consecutive years, carrying off one victim each time.

When a death occurred in one house, usually one or more victims in same family went. The disease was, in nearly all cases, asthenic in type, and very rapid. One child at the breast was to all appearance well one day when I saw him; the next day I was called to see him, when I found his pharynx covered with the membrane. He was cyanosed, choking, and pulseless. In twenty-four hours he was dead. His little brother was seized next day, and was dead in four days. The day he was buried his mother showed signs of it, and although she had a severe attack, in nine days she was up on a chair. Person after person who visited the house contracted the malady, and in all eight people were affected, with however no more fatalities. To show the virulence of the attack, one girl of 18, who came to see her aunt who was just recovering from an attack in the same house, was down with the disease twenty-four hours afterwards. Her's was the worst case of all which recovered. The fauces, palate, uvula, base of tongue, part of pharynx, and probably the larynx, were one huge mass of greyish-white membranes. Time after time they were destroyed, but only to return, and when she did recover, she was ill and paralysed for nearly six months. Her mother, a woman over 50, came to nurse her, and was stricken down, and one began to wonder where it was going to end, and who would go next. Fortunately, the epidemic came to an end soon afterwards. I made strict enquiries where the drinking water was taken from, and was shown a well near the creek bank, at the bottom of which stood some water, nearly a foot below the level of the water in the creek, which was just a few feet distant. We had the well closed, and tank water, which had been filtered, used, and no more cases appeared in that house. I had the water examined under the microscope, and found it contained fungi in the form of spores and mycelium in great quantity, besides a lot of amorphous substance. This I put down as the *prima causa* in this house's trouble.

Nearly every house where the disease showed itself was built on the edge of a creek, and this made me almost certain that the epidemics were due to malarial influences, or to bad water, or both. In cases where there was a fatal result, it was very rapid, only one living six days (an infant of six months), and he suffered from a relapse. The majority died within three days after the appearance of membrane. The only complications in all these cases were albuminuria, epistaxis, and diphtheritic paralysis. The first of these occurred in six cases, two having a fatal termination, the others being recoveries. Epistaxis occurred only twice, once in the young girl of 18, whose case I specially referred to previously, and always followed an attack of vomiting—vomiting being a prominent symptom in her case all through. The other

case in which epistaxis occurred was that of an adult—a young man of 26—who walked to my consulting-room at the time at which the last epidemic was at its height, and who stated that his nose had bled all night, and that his throat was sore. On examination, I found a diphtheritic patch on his right tonsil, which quickly spread to the fauces, and then to the other tonsil. He made a good recovery.

Diphtheritic paralysis occurred more or less marked in five, two only being severe. The first case was that of a child whom I was called to see, her father, when he came to see me, telling me that his daughter, a child of eight, was unable to walk, or use her arms, or even to swallow. After seeing the child, on enquiry, I found that about ten days before they noticed any loss of power, she had complained of a sore throat, and her mother on looking down the throat, saw a white patch, to which she applied powdered sulphur repeatedly till it disappeared, and the child apparently was all right in a few days. Not till some days afterwards, did she complain of inability to walk, and then to swallow, as when she tried to swallow it made her cough paroxysmally, almost to the verge of choking. She was almost completely paralysed ; she was unable to speak, to swallow, to hold her head up, and if it were held up, it would fall forward on her chest. The upper and lower limbs were almost quite powerless, the urine escaped involuntarily, and the bowels had not moved for days, and to crown all, she was quite cyanosed. She ultimately recovered.

The other case is the one I have referred to so frequently, viz:—that of the young woman of 18, who had such a severe attack, with vomiting and epistaxis. Early in the course of the disease she had great difficulty in swallowing, and if anything solid were attempted, she would cough till she was almost asphyxiated. This increased so rapidly, that all food had to be stopped by the mouth.

Treatment.

In speaking of treatment, I have no intention to go into the different methods of treatment advocated by different authorities on the subject, but will simply give in detail the methods I adopted in different cases, with the apparent results, giving failures as well as successes.

When I began to attend diphtheria, I did so with the unfortunate feeling, that to give perchloride of iron and chlorate of potash internally, and apply perchloride of iron and sulphurous acid locally, meant a certain cure, and I entered comfortably on such treatment. This feeling one conceived from seeing records of men in apparently honorable positions and large practices, such records being published with the view of showing that diphtheria was in the hands of such men a simple affair, in fact, that if other men lost cases, they were morally guilty of culpable homicide.

One man recorded 300 cases without a death. Lately, we have seen recorded sixty or seventy or eighty cases without a loss. Could one believe this possible, diphtheria would cease to be the dread disease which every conscientious physician believes it to be ; but when one sees records such as these, they either doubt the recorder's veracity or his diagnosis. In all cases, the treatment generally was what every one naturally resorts to.

(1) *Internal Medicines.*

Large doses of potass. chlorate and tinct. ferri. perchlor. were given internally, where it was possible to get it swallowed, but this was impossible in at least one-fourth of the cases, viz:—in children of very tender years, and a few older ones, who struggled so violently that it was considered inadvisable, after one or two attempts, to force them to take the medicine.

(2) *Diet.*

The diet was in all cases, from the moment of seeing them, of the most nourishing kind. Milk, strong beef tea, chicken soup, and jelly, oysters, especially in adults ; and lastly, cream was administered in a number of cases where beef tea and chicken soup could not be taken without causing nausea. Fortunately, as I stated before, the cases were nearly all in households where all these forms of nourishment were in abundance, and I feel certain that, had they been otherwise, I would have had a greater number of fatal terminations. I should have mentioned that switched eggs, with milk and brandy, were used freely. So far, the treatment mentioned is what is done by almost every medical man who is called to see a patient suffering from diphtheria ; but it is better to give every detail of treatment, so that the different parts of the treatment will have their own share of credit or discredit.

(3) *Local Applications.*

The first few cases in the first epidemic, I also treated by local applications to the diphtheritic patches and throat generally of liq. ferri. perchlor. and glycerine, one to four ; but although only two deaths occurred out of the eight so treated, I had the feeling that had I not used it in one of those two cases, it would have recovered also. The application caused such intense congestion and catarrh of the pharynx, spreading thence to the larynx, that I stopped it altogether in three cases after a few applications ; and one strong girl of 12, who certainly was in a very low state before the last application, died from asphyxia thirty minutes after the application, her mouth and throat being full of frothy mucus.

I then resorted to the local treatment advocated by Dr. Robert Bell, of Glasgow, who claims to have had few, if any, deaths in several hundred cases, viz., glycerin. acid. carbolic c̄ liq. ferri perchlor. and acid sulphurosum. This did well in some cases, but did not prevent death occurring in a case in which the treatment was carried on from the start. It also had the objection noticed in the perchloride application, causing intense congestion of pharynx, and profuse mucous catarrh. I then tried the application of carbolic acid. This I applied pure with a glass brush, painting the patches whenever they appeared in adults, and equal parts of glycerine and carbolic acid in cases of children ; then sprayed the throats every two or three hours with the following :—℞ Acid. carbolic. ℨj, glycerini ℥iv, aq. ad. ℥xij.

The results were excellent ; where the case was seen early, and the patches destroyed at once, the disease was very much shortened, and in several cases the patches did not reappear. In fact, in two adults, the attack was to all intents and purposes aborted, that is to say, the pain

in throat, ear, and neck disappeared; they picked up strength in a day or two, and were going about their usual occupations in a week. This last form of treatment I used almost as a matter of course for a good number with the nourishing diet referred to, and for a while with good results; but at last one fatal case, followed by another, showed that even though excellent results from it were obtained, still that it was by no means to be looked on as a specific. It was at this time that I was attending the young woman referred to so frequently before. It was a most virulent attack, the fauces, tonsils, pharynx, &c., being, as I stated before, one mass of dirty greyish looking patches. I destroyed the patches with carbolic and glycerine, equal parts. The usual stimulating diet was ordered, and the spray of carbolic acid, glycerine and water ordered every two hours. Persistent vomiting set in, accompanied by epistaxis, and next day she was distinctly worse, dyspnœa being marked, and the face pale and anxious. The membrane had reappeared worse than ever, and she was soon in a critical condition, no food nor drink being retained by the stomach. I immediately resorted to nutritive enemata every two hours, the bowels to be cleared out once a day by an enema of pure warm water, each enema to consist alternately of two ounces of peptonised milk and beef-tea, with a dessert-spoonful of brandy in each. In desperation as to further local applications to the throat, and as tracheotomy would not be permitted, I thought I would try the solvent action of zymine, so I altered the spray as follows:—℞ Zymine ʒij, sodæ bicarb. ʒij, aq. ad. ℥iv, to be sprayed every two hours alternately with ℞ Acid. carbolic ℥j, glycerine ℥j, aq. ad. ℥xij. Twenty-four hours afterwards, one would hardly have known the girl; the throat had cleared to a great extent, leaving however extensively sloughed surfaces. The face was easy, and breathing much better. The vomiting and epistaxis had both stopped, and she was able to retain the enemata, which I ordered to be continued for other twenty-four hours. The spraying was to continue as before. Before giving up the enemata, the next day I tried if she could swallow, but she rather alarmed me by nearly choking and coughing paroxysmally. Soon afterwards, other symptoms of diphtheritic paralysis supervened, and I continued the enemata for about a week, adding liq. strychniæ m. v, three times daily. She was weakly, and not able to do much for over six months, but is now well and strong.

This treatment of applying zymine locally, alternately with carbolic acid and glycerine, I have tried in eighteen or twenty cases, and in none of them was there a fatal termination. Whether this result was simply *post hoc* or *propter hoc*, I cannot say, but theoretically zymine should be valuable in diphtheria, and certainly deserves a fair trial.

The other case of diphtheritic paralysis I only saw after it had developed, and she seemed to me to be *in extremis*. I resorted to the same treatment, and she, after lingering for a little, slowly improved.

(4) *Inhalation of Steam and Eucalyptus.*

As to steam inhalations, I tried them in at least a dozen cases; but from the cause I referred to before, viz., draughty houses, I was unable to continue them. The apparatus for employing the inhalations (which all contained eucalyptus) was very imperfect, and no trained

nurses being obtainable—consequently the orders for giving them not being correctly carried out—I was forced to desist. I would find the atmosphere in the room damp, the bed clothes damp, everything in the room in fact damp, from rapid condensation due to the quite too free ventilation.

Tracheotomy.

Referring to tracheotomy, I only performed it on two occasions—one successfully, the other with a fatal issue. The first one I performed on the fourth day of the disease, and resorted to rectal alimentation every three hours, and the child was well in a fortnight. In the other case referred to, I was not permitted to do the operation till the child was choking; even then the relief was so great that the parents regretted their obstinacy in not permitting it before. He lived twenty-four hours.

I find that there is a great prejudice existing in the public mind, at least in the country, against tracheotomy. The parents generally say, "If my child is to die, it will die, but don't give it any more pain than it has already," and one cannot reason them out of it. This, I dare say, does not apply to the people in the city quite so much, for as a rule they have more education, and are more able to comprehend the increase of hope of the child's life by an early operation, compared to leaving the question of operation till the child is almost moribund.

Summary.

In summing up this rather fragmentary contribution, I should like to draw your attention to the following points, which I consider the salient ones :—

As to Etiology.—I believe that in certain districts of this colony diphtheria is endemic. I have pointed out already that it is endemic in my own district, and notably in some parts of it. I also have pointed out that it occurred in a much greater percentage of adults than is generally appreciated, and this I put down to the cause just mentioned, viz., endemicity.

In purely epidemic diphtheria (and I suppose this holds good in some other infectious diseases) very few adults are affected; but oppositely, where the disease is endemic, I am convinced that adults run almost as great a risk as the children. Certainly their powers of resistance are greater; and if diphtheria arises in the districts referred to from bad water, or malarious influences, the only difference in their susceptibility is their power of resistance, and the same, I think, accounts for there being no deaths among the cases in adults referred to.

As to Season.—The four epidemics all occurred in autumn, when everything was burned up after the summer heat; when the rivers were low, and their muddy banks were exposed to a hot sun; when the air was dry and non-refreshing, full of dust, and probably particles of decayed matter; and, which I think is, perhaps, more important than either of those just mentioned, when everybody was worn out by a long hot summer, leaving their staying powers very much below par.

Two points in *Treatment* are worthy of note:—(1) Early rectal alimentation which is medicated by the addition of doses of liq. strych.

suitable for the patient; and in this, I think, we have the means of saving many lives, especially in young children who won't swallow medicine, and won't swallow food for fear it contains medicine. This I would earnestly ask some of you to give a trial. (2) The local application of zymine as a solvent of the diphtheritic membrane. I am persuaded that, in the cases I have recorded, it did act as a solvent of the membrane when I could not get rid of it otherwise. The number of cases I have tried it on are too few to permit one to dogmatise; but I would suggest that it may be a very valuable adjuvant to our paraphernalia of diphtheritic applications. As to the abortive treatment, by applying pure carbolic acid to the patch in the early stage, I fully believe that in a case seen early you can, in certain instances, shorten the duration of the disease.

DISCUSSION ON DIPHTHERIA.

Dr. Hayward (Adelaide) did not think that the constitutional symptoms were always secondary. He had seen the constitutional symptoms precede the local changes. With regard to treatment, antiseptics were necessary, but he preferred to give them internally.

Dr. Nicholson (Benalla) did not think the disease was a local one. He had seen a case of diphtheria located in a boarding-house full of boarders; he had sucked up the false membrane, and he did not regard the disease as being very contagious. The presence of albumen in the urine was no criterion in diagnosis.

Dr. Appleyard (Tasmania) commented on Dr. Jamieson's paper.

Dr. Curtis (Semaphore) said death rarely occurred in the tonsillar cases, but nearly always occurred in the laryngeal cases. He used turpentine internally and externally.

Dr. Scott (Warrnambool) regarded diphtheria as just as contagious as small-pox or gonorrhœa. He strongly recommended the use of eucalyptol or turpentine in the form of sprays. He feared that the use of carbolic acid tended to produce paralysis afterwards.

Dr. Joske (Melbourne) had sucked up diphtheritic membrane in a tracheotomy case. Three days afterwards his fauces and tonsils were inflamed and covered with false membrane, and he suffered from fever. He was ill for eight days, and recovered in fourteen.

Dr. Hudson (Nelson, N.Z.) regarded diphtheria as a local disease. Membranous croup and diphtheria are identical. At the same time we must remember that it is not always easy to distinguish croup from forms of laryngitis. He preferred sulphurous acid as a remedy.

Dr. Wooldridge (Melbourne) said if croup and diphtheria were identical, then diphtheria had existed for a very long while. He was in the habit of removing the membrane mechanically.

Dr. Coane (Melbourne) believed that the local spread of diphtheria can be prevented by the application of a nitrate of silver solution, twenty grains to the ounce.

Dr. B. J. ADAM (Beaufort) used inhalations of eucalyptus oil in his practice.

Dr. NEWMAN (Geelong) referred to the strength of oil used.

Dr. SPRINGTHORPE (Melbourne) said a large number of cases of "diphtheria" sent into the Melbourne Hospital turned out to be epidemic influenzal sore throat. Locally there was a deposit of mucus, simulating false membrane. In those cases in which the catarrh invades the tonsillar and epiglottidean regions, the resemblance was marked. It is probable that such cases, and also cases of simple catarrhal laryngitis, are called diphtheria in practice.

Dr. J. W. BARRETT (Melbourne) said it was quite obvious, from the remarks of speakers, that a distinction must be made between diphtheria and such affections as follicular tonsillitis on the one hand, and between diphtheria and forms of laryngitis, attended with mucoid exudation (but not with formation of false membrane), on the other hand. Dr. Jamieson had related cases in which the inoculation of the diphtheric poison had produced diphtheria. Dr. Joske had related his experience in the matter, and he (Dr. Barrett) knew of a case in which a medical man succumbed to diphtheria brought on by sucking false membrane out of the trachea in a tracheotomy case. It seemed to him absurd to endeavour to refute the conclusion based on the exact and definite evidence adduced by Dr. Jamieson. This conclusion was that diphtheria could be produced by local inoculation ; the facts did not prove that it could not be produced in any other way.

Dr. JAMIESON, in reply, said that there were forms of laryngitis and of tonsillitis which are not diphtheria, but which are often difficult to distinguish from true diphtheria. These affections, probably, predispose to diphtheria.

SECTION OF PSYCHOLOGY.

PRESIDENT'S ADDRESS.

By F. N. Manning, M.D.

Inspector-General of the Insane in New South Wales, and Lecturer on Psychological Medicine in the University of Sydney.

In taking this chair, I have first to acknowledge the courtesy and consideration which induced the Council of the Congress to select as the President of this Section, the senior officer of the Lunacy Department of the mother Colony, and next—it being my good fortune to occupy this position—to express my personal gratification at presiding over the First Session of the important Section of Psychological Medicine.

The choice of a subject on which to address you required some thought and consideration. I could scarcely hope to say anything very new or very interesting on the more abstract and scientific questions pertaining to our specialty ; and remembering that this is our hundredth birthday, it occurred to me that I might, with interest to you and possibly with interest and advantage to those who may come after us, review our present position in regard to lunacy matters in Australia ; set up in fact a sort of mile-stone on which to record our position and progress ; and then, if time permits, indicate some of the steps which it behoves us to take on our path onward.

I shall trouble you as little as possible with statistical details, beyond what are necessary to bring out and make clear the more salient and important facts, and shall relegate to an appendix various tables and returns, which are of considerable interest, and for the means of compiling which I am indebted to my *confrères* and co-workers—the heads of the Lunacy Departments in the various Australasian Colonies. The returns from New Zealand are given separately. It is much to be regretted, that the statistics from Western Australia are so imperfect as to be useless, except on one or two main points ; but I felt that I could not trouble Dr. Barnett for more details, after his statement in reply to my second letter of enquiry, that his "asylum work was merely an item of his general duties, and that he had no assistant."

The first point I shall notice is, the proportion of insane to population :—

On December 31, 1887 (and I may mention here, that all the statistics I have collected go to the close of 1887), the population of the Australian Colonies was 2,951,590, and the number of insane, 8,435.

There was, therefore, 1 insane person in every 349, or 2·86 per 1000; the proportion of insane men being 1 in 330, and that of women 1 in 377 (Table I).

There was considerable difference in the proportion in the different colonies (Victoria, 1 in 294; Western Australia, 1 in 351; New South Wales, 1 in 369; New Zealand, 1 in 380; Tasmania, 1 in 399; Queensland, 1 in 419; South Australia, 1 in 431), Victoria heading the list with 1 insane person in every 294, and Queensland and South Australia closing it with 1 in 419, and 1 in 431 respectively. The proportion in New Zealand was 1 in 380. The reason why lunacy is more prevalent in Victoria than in the other colonies, I must leave for your discussion, merely suggesting that the returns seem to point to a somewhat over stringent registration—patients on leave of absence being retained on the books for long periods. In the case of Queensland, there has been hardly time for the full accumulation of chronic cases—a process which takes some years.

How does the proportion of insane in Australia compare with that in Great Britain and Ireland? On December 31, 1887, the proportion in the mother country was 1 in 342, or 2·92 per 1000; the range being from 1 in 316 in Ireland, to 1 in 346 in England (Table II). So that at present the burden of insanity in Australia is somewhat less than in the United Kingdom (1 in 349 in Australia, as against 1 in 342 in Great Britain and Ireland).

Is insanity in Australia increasing in proportion to the general population? I must answer this question in the affirmative, and add that the increase has during the last 10 years been only a slight one, and would appear to be due to the accumulation of chronic cases, and not to any proportional increase in the rate of "occurring insanity." On December 31, 1877, the proportion of insane to population was 1 in 356, or 2·80 per 1000, as against 1 in 349, or 2·86 per 1000 ten years later, by no means a large increase, and mainly in the younger colonies. In the older colonies there was even some decrease. In Tasmania, the proportion decreased from 1 in 317 in 1877, to 1 in 399 in 1887. In New South Wales there was a slight decrease. The proportion in Victoria was practically unchanged. South and Western Australia and Queensland showed an increase—greatest in the latter colony (Table I).

The admissions in proportion to the population, which show the ratio of "occurring insanity," were in 1878, 1 in 1550; and ten years later, 1887, had dropped to 1 in 1738; the average for the 10 years being 1 in 1690 (Table III).

The nationality of the insane at present under care is of interest now, and will be of equal, if not of greater interest, to those who may examine our statistics some years hence. These statistics are not as exact as

they might be, owing to imperfect returns from Victoria and Tasmania, in which the nationality of a considerable number is returned as "unknown"; but they show several important facts, the chief among them being, that only 23·12 per cent. of the insane now under care were born in Australia, and that the larger proportion of our patients therefore are of other than Australian nationality. Upwards of 26 per cent. are from Ireland, 23 per cent. from England, 6 per cent. from Scotland, 2 per cent. from Germany, and 2 per cent. from China; whilst under the heading of "other countries and unknown," nearly $14\frac{1}{2}$ per cent. are tabulated. Of these, about 5 per cent. come from countries other than those already specified, and include stray specimens of nearly every race and nationality. Those tabulated as "unknown" in the Victorian and the Tasmanian statistics, are evidently of foreign as opposed to Australian nationality, and by far the larger proportion should be credited to England, Scotland, and Ireland, and go to swell the already large percentages from these countries (Table IV).

The proportion of patients of Australian nationality is, as might be expected, much greater in the older than in the younger colonies, and ranges from 12 per cent. in Queensland to 32 per cent. in Tasmania. No detailed census has been taken since the year 1881, and it is not possible therefore to fix accurately the relative proportion of the insane with regard to nationality; but there can be no doubt that the proportion of insanity is, throughout Australia (as it was in New South Wales in 1881), much greater among the foreign than among the native born. At that time, in New South Wales, the proportion of insane per 1000 among persons of British nationality, was 8·03, and among foreigners 6·87; whilst among Australians, it was only 1·22 per 1000.

The comparatively small proportion of insanity among Australians is partly to be accounted for by the fact that fully one-third of these are children, whilst insanity is mainly a disease of middle life and old age; but there are some reasons which I have not time to detail, which lead to the pleasant conclusion, that Australians are less subject to insanity than people of other races living in Australia.

Turning now to the question of the recovery and death-rate of insane persons under treatment and care, it is satisfactory to find, that with all the imperfections of Australian asylums, and the difficulties with regard to management which beset us, but from which the medical officers in English asylums are happily free, our recovery and death-rate compare not unfavourably with those in asylums in the mother country. Taking the decennial period from 1878 to 1887 (and statistics on these points are apt to be misleading unless they include quinquennial or decennial periods), the recovery rate in Australian asylums was 42·09 per cent., whilst in addition 6·97 per cent. were discharged as relieved, as com-

pared with a recovery rate of 40·04 per cent. in English asylums for the corresponding ten years. The recovery rate in Scotch and Irish asylums averaged a little below 40 per cent. for the same period.

It should be noted, however, that whilst the statistics of Australian asylums include idiots—a very incurable class—these are eliminated from the English statistics, and the Australian returns are therefore even better than they would at first sight appear.

The death-rate in Australian asylums for the decennial period above mentioned was 7·09 per cent., whilst in England it was 9·58, and in Scotland 8·50. The death-rate in the various colonies was as follows:—Queensland, 5·82; New South Wales, 6·72; Victoria, 7·11; Tasmania, 8·00; South Australia, 9·00. The New Zealand death-rate was 5·94 (Table V). The returns from Western Australia are incomplete.

The small death-rate in the young colonies of Queensland and New Zealand is interesting in connection with the rapid increase of insanity in these colonies, and the difference between the Australian and English rate goes far to account for the somewhat rapid growth of insanity in all the Australian colonies as compared with the mother country up to very recent years. The warmth and equability of our climate, which render our patients much less liable to pneumonia and other chest affections than the insane in Great Britain, have, I think, more to do with the low death-rate than any other causes, and it is interesting to observe that, with one exception, the warmer and more equable the climate, the lower the asylum mortality.

With regard to the classification of the insane, it appears that of the total number 9·35 per cent. are suffering from undeveloped intellect—are, in fact, imbecile or idiotic; 3·07 per cent. are under criminal disability; nearly 1 per cent. are still at the charge of the Imperial Treasury—the relics of a by-gone *régime*—and 86·59 per cent. belong to the ordinary class of the insane who have had intellect and lost it, and who are under no criminal ban (Table VI). Only 1188 of the total number of 8435, or 14·08 per cent. are deemed curable; so that the large mass of our asylum population consists of chronic and incurable patients (Table VI). The differences in the proportion of the various classes in the different colonies as shown in Table VI are interesting, but I have not time to discuss them or their probable causes.

I should have been glad to discuss the question, "Does insanity, as seen in Australia, differ in its forms and types from insanity in other countries?" but on this point I must content myself with placing before you one or two facts relative to general paralysis, a most interesting and typical form of insanity, which has only been fully known and recognised in modern times, and which is undoubtedly increasing in frequency.

This peculiar affection is at present much less common in Australia than in England. The proportion of general paralytics admitted to Australian asylums in 1887 was 1·8 per cent. of the total number admitted, whereas the proportion admitted into English asylums for the same year was 8·6 per cent. (Table VII).

Again, the proportion of general paralytics admitted to the New South Wales asylums for the quinquennial period 1883 to 1887 was 3·4 per cent., whilst the proportion admitted to English asylums for the same period was 8·4 per cent. (Table VIII). This disease already appears more common in the older than in the younger colonies, and it will be interesting to observe if it increases in all.

I may note in passing that as yet epilepsy is decidedly less common in Australian than in English asylums (Table VII).

Time will not permit of any lengthened notice of the lunacy laws of the Australian colonies, but this is a subject which I cannot pass over altogether in silence.

Each colony has its own Lunacy Acts, passed at various dates, commencing with that for Tasmania in 1858, and ending with that for Queensland in 1884. The foundation of all of them is English law and precedent. The superstructure varies with colonial needs and expediency. The scattered population, the paucity of qualified medical practitioners, the enormous distances, and various other matters, have had to be taken into account, and legislation adapted thereto.

In all the colonies (except in the case of indigent patients committed by Justices in Tasmania and South Australia, where one medical certificate is accepted) two medical certificates are required before patients can be admitted to hospital. In all, patients can be admitted at the "request" of relatives or friends, if such request is accompanied by two medical certificates. In all there are stringent provisions, that the persons signing the "order," "request," and certificates shall be independent and unassociated persons. In all there are provisions for the rejection of imperfect certificates; and in all, except Tasmania and South Australia, where there are special arrangements, the medical officer of the hospital must give a separate and independent certificate of insanity within a brief period after admission, or the patient cannot be detained. There are also in all abundant provisions for inspection by inspectors, commissioners, official visitors, or other authorised officials, and the interests of the patients are as fully guarded with regard to discharge as to admission.

On the whole, the lunacy laws of the Australian colonies appear to be satisfactory, sufficient, and well abreast of the time. They are in no way behind, and in some respects ahead of the legislation in Great Britain, the United States, Canada, and the principal European countries.

In the provision of reception-houses in New South Wales and Queensland, and of lunacy wards in public hospitals in Victoria, for the treatment of insanity in its early stages, the Statutes are decidedly in advance of those of Great Britain.

During the year 1887, the Master in Lunacy in New South Wales applied to the English Courts for the payment to him of money belonging to a patient in one of the hospitals of the colony, and in delivering judgment* Lord Justice Cotton thus expressed himself:—"We have been referred to the Lunacy Act of New South Wales, and undoubtedly that Act contains provisions which make it practically impossible that anyone should be in an asylum without sufficient reason." Whilst Lord Justice Bowen said:—"I desire most emphatically to add my voice to what has been said by the Lord Justice as to the provisions of the Colonial Legislature, being above all comment and criticism as regards these insane patients. We have the most ample confidence, not only in the legislation, but in the officers who administer the law, and the patient is surrounded by all the protection and safeguards that could reasonably be invented for the purpose of taking care of herself and her property."

What is here said of the lunacy laws of New South Wales might, I believe, be said with but little reservation of the lunacy laws of all the Australian colonies. The newer Acts are, as they should be—the better. Our younger sister, Queensland, has been able to see the few weak points in the legislation of the older colonies, and avoid them.

Whilst I am on this subject, I may mention that during the last three or four years there has been in England an outcry for the reform of the Lunacy Acts, and so-called reformers have advocated three radical changes:—

(1) That no patient shall be sent to an hospital or licensed house, unless examined and committed thereto by a judge or magistrate.

(2) That all such committals shall be for a definite time—say one or two years, and shall be renewed if necessary.

(3) That all medical certificates shall be signed by specially appointed medical practitioners or experts.

I think there is reason for the strongest objections to each and all of these proposals. It is clear that they would widen the breach between the care and treatment of diseases of the brain and diseases of other organs, which for years all the teaching, all the endeavours, and all the wisdom of modern science has been endeavouring to close and annul, and did time permit, I should, I think, be able to show that such legislation would be a retrograde step, and be able to give good and sufficient reasons for its rejection.

* Law Report, Chancery Div., Part 12, 1887.

As yet there is no special legislative provision for idiots and imbeciles in any of the Australian colonies, and the English "Idiot Act of 1886," entitled "An Act for giving facilities for the care, education, and training of idiots and imbeciles," might with advantage be adopted.

In Great Britain, there are various methods of providing for the insane. Besides State institutions for criminals, and for the insane of the military and naval services, there are county, district, and parochial asylums, as well as lunatic wards in poor houses, under the management and control of local authorities, and the inspection of Government Officials; lunatic hospitals under trustees, in which the excess payments of the well-to-do are used for the support of those less favoured of fortune; private asylums, which receive patients at rates suited to almost all classes of paying patients; a system of payment to relatives towards the support of the insane poor; and in Scotland and other places "boarding-out" with strangers who have no connection with, or interest in, the patients, except the monetary one.

In Australia, with the exception of private asylums in New South Wales and New Zealand, the whole of the institutions for the insane are under State control, supported by funds provided by Parliamentary vote, and managed directly by the Government, and there is no established system of payment to relatives, or "boarding-out."

In Great Britain, with an elaborate system of local government, the result of long experience, the local or district provision for the insane leaves little or nothing to be desired. In America (where local government is less completely organised), whilst the State asylums are admirable, the institutions under local or municipal control are for the most part dismal failures. The fifth report of the State Committee on lunacy of the Commonwealth of Pennsylvania, published only a year or so ago, contains the following statement:—"The entire arrangement and government of many of the county institutions are such that the insane poor cannot be otherwise than neglected and cruelly wronged, and the treatment of this unfortunate class in poorhouses has been simply that of continued neglect." The details given in this and other reports, from Pennsylvania, New York, and other States, are simply horrible.

I see nothing in the present state of local government in Australia which leads me to think that municipal or county authorities would be any better guardians for the insane than they are in America, and I think our insane fortunate that they are, so far, wards of the State. It would be well, however, if our State institutions were supplemented by others, like the lunatic hospitals at home, managed by trustees for the good and profit of the patients only, and bearing the same relation to the sick in mind as our general hospitals do to the sick in body.

As yet, private benevolence has not stepped in to assist in the maintenance and care of the insane in Australia. We have no institutions like the Maclean Hospital in Massachusetts; the Pennsylvanian Hospital for the Insane at Philadelphia; the Hospital at Coton Hill, near Stafford; Barnwood House, near Gloucester; the Friends' Retreat at York; St. Andrew's Hospital, Northampton; the Holloway Sanatorium at Virginia Water; Murray's Asylum at Perth; the Crichton Institution at Dumfries; or the several Royal Asylums at Edinburgh, Montrose and Glasgow, and other cities. I mention these as types of many others in Great Britain and America, all of them magnificent institutions, built or endowed by private beneficence, for the care of patients who are not able to meet the charges for maintenance. In the small New England State of New Hampshire, upwards of £54,000 has been bequeathed for the benefit of the patients in the State asylums, and the interest is now expended by the trustees for their benefit. This is by no means an exceptional instance in America; whilst, so far as I am aware, not one penny of private means from subscriptions, donations, or legacies, is available for the maintenance of insane persons in this great continent.

I trust that such an opprobrium will not long continue, and that ere long, the sick in mind may share with the sick in body in the contributions of the benevolent. I know no way in which the surplus wealth of the rich can be better expended. I know no way in which more real solace and comfort can be afforded, and a truer charity exercised, than in placing in a position of comfort the minister of religion, the physician, the artist, or the teacher who would, except for such aid and assistance—owing to the loss of all means through a cruel malady — be left to the charity of the State, and have to herd with the vagrant and the pauper, though still refined, still cultured, still with the instincts of a gentleman.

Again, though I am no advocate for private asylums, I think these institutions—for the richer classes—have a useful place in an asylum system, and can make provision for those who cannot be so adequately cared for under the, perhaps necessary, restrictions as to outlay in Government institutions.

Until within the last few years, all the hospitals for the insane in Australia received all classes, and were in no way specialised; but with the growth of population, the wisdom, nay, the necessity, of providing separate accommodation for criminals, for idiots and imbeciles, and for the large class of chronic insane, has been recognised.

New South Wales, Victoria, and Tasmania have already, practically, distinct institutions for criminals. In New South Wales there is a separate hospital for idiots. In Victoria and Tasmania these classes are

placed in cottages—separate from, though in connection with, the hospitals—and the Victorian Government, to its great honour, has lately made a distinct step in advance, and commenced a system of special education and training, after English and American models, for this feeble-minded class.

The much-debated subject of the separation of the acute and chronic insane, by placing them in different institutions, has found a practical settlement. At Parramatta in New South Wales, Sunbury in Victoria, and Ipswich in Queensland, buildings erected for other purposes, and unsuited for the more demonstrative classes of the insane, have been set apart for chronic cases, and there can be little doubt but that this arrangement will be more fully carried out in the future, as tending to economy and more systematic classification.

The system under which all patients who are brought to our hospitals in all the Australian Colonies are admitted, whether there is room or not, is one that, so far as I am aware, obtains in no other country—certainly in no other English speaking community. In Great Britain, in the United States, in Canada, a standard of accommodation is fixed, and no patient is admitted in excess of this. In Great Britain, the numbers in excess of the accommodation in local asylums are accommodated temporarily in the asylums of other districts, in licensed houses or poor-houses. In Canada and the United States, the temporary accommodation provided is in poor-houses, or other receptacles, and the patients must await their turn for admission, should the State asylums be full. Our system has one advantage, it gives us our patients in an early, and in many cases curable, stage of their malady ; but it has disadvantages which outweigh this. It does not allow us to do our best for them when we have got them. Our accommodation (I speak from twenty years' experience) is seldom or never in advance of our needs. It is often grievously behind them ; and the over-crowding consequent on this is subversive of all order, cramps, if it does not paralyse, the best efforts of our medical officers, and is too often fatal to the mental health of our patients.

If this system of admission is to be continued, it should be in connection with one for providing more speedily, and under less restrictions than at present, ample and suitable accommodation—and this, gentlemen, I fear, will never be until the management of our asylums is placed in the hands of persons (a Commission it might be—these are the days of Commissions) who will have more weight, and be more listened to by the Government, than any single head of a department, even if an embodied importunity, can hope to be. I think I have not been remiss in urging the claims of the insane in New South Wales ; but the accommodation in that Colony is still far short of what is necessary to

give 600 cubic feet per patient—the least space necessary for health, quiet, and efficient administration ; and I gather that the same condition of things exists in other colonies.

Some of the buildings in use for housing the insane in Australia are strangely different to what they should be, and require improving off the face of the Continent. There are some in Tasmania, in Victoria, and in New South Wales, which are heart-breaking to those having charge of them ; but it is to be hoped that these will soon be things of the past, and the fine piles at Kew in Victoria, at Parkside in South Australia, at Callan Park in New South Wales, at Toowoomba in Queensland, and at Seacliffe near Dunedin in New Zealand, are evidences of a large and wise liberality, and an earnest of advancing civilisation.

The number of medical officers to patients in Australian asylums is at present far below what it should be. In the United States, it is 1 to every 160 ; in Ontario, the foremost State of the Dominion of Canada, 1 to 209 ; in Great Britain and Ireland, 1 to 250 ; in Australia, 1 to 325.

I understand that arrangements have been made in South Australia to commence this year with one additional medical officer, and the New South Wales Parliament has provided means for the employment of two in addition to the present medical staff.

Under disadvantages, some of which I have indicated, we may, I think, be proud that non-restraint in the treatment of our patients is our rule—restraint the occasional exception. From the returns furnished to me from all the Australian and New Zealand asylums, it appears that restraint is on an average used only in 1 out of 300 or 400 cases, and then chiefly for surgical reasons, or to guard against suicide.

Thus much as to our present position. And now, turning from the present to the future, what are to be our further onward steps in the care and treatment of the insane, and in the advancement of Psychological Medicine ? To the amateur alienist—at all events in Victoria—the great desideratum would seem to be the replacing of what are somewhat unfairly called barrack buildings by cottages ; and if one is to trust newspaper reports, the Government of Victoria is about to take the astounding step of housing some 1500 insane patients in cottages, and placing this "City of the Simple" at some distance from the metropolis.

The objections to this scheme have been so ably set forth by Dr. Barker, an officer of the Victorian Lunacy Department, that it is perhaps not necessary for me to go fully into the subject. Something, however, I must say on this point.

Whilst I am very decidedly of opinion that cottages should form a part of every Hospital for the Insane, I am also of opinion that they cannot be very largely used, and that for three-quarters, if not nine-tenths, of the insane under hospital care, cottages will be found altogether unsuitable. They are costly to build, costly to work, difficult to administer and supervise, and add little or nothing to the comfort and well-being of the patients placed in them. The truth is, that the large majority of patients when fit for cottages are fit for discharge. For convalescents, for certain of the chronic insane – especially the steady workers who do so much to carry on the farm and garden operations of all hospitals—cottages afford a comfortable and suitable home. For the sick they are unsuitable, as withdrawing them too much from efficient medical supervision ; for a great majority of acute cases, for the excited, dangerous, and turbulent, they are unsafe ; and for the chronic dements, the dirty, the paralytic—who make up so large a part of all asylum population—they involve too much expense, and too extended a supervision, without any commensurate result. Let us have cottages as part of our hospitals by all means. So far as the hospitals under my supervision are concerned, I could wish for a decidedly larger proportion of this class of accommodation, but I do not anticipate any great amelioration of the condition of the insane by this means, and if the official programme is to be carried out in Victoria, I fear it will be a costly mistake. The truth is, that no one form of building can meet all the needs and requirements of the insane. Cottages alone will be as unsuitable as "barracks" alone. What is required is variety in the construction, arrangement, and position of the buildings of an asylum, so as to allow of judicious segregation, and to provide for the wants of patients of different classes. If I am to indicate briefly what I consider the best form of asylum ; what it is desirable that the Psychopathic Hospital of the future should consist of—I should stipulate for a central hospital for the sick and for acute cases, surrounded by pavilions or blocks of varying form and construction for different classes, and supplemented by cottages for the convalescent, the quiet, and for certain chronic cases. The buildings should stand on a large estate, and be spread over a considerable area. They should contain abundant space, with light, airy, cheerful day rooms, large verandahs, and well-ventilated dormitories. It is essential that a quarter, at least, of the total accommodation should be in the form of separate or single rooms. It is important—at all events in our climate—that the day rooms should all be on the ground floor, so as to afford direct and easy access to the verandahs and the open air. It is even more important that the blocks or divisions should be comparatively small, so as to prevent too large an aggregation of patients, and sufficiently numerous so as to allow of a

varied classification. These are our main requirements, and I would point to the Eastern Hospital for the Insane at Kankakee, Illinois, as perhaps the best existing model. Special architectural forms or styles are but of secondary importance, but I would plead for space as against outside ornamentation, which is too often only a mockery of the misery within.

The boarding-out of pauper children has been so unqualified a success, that it has been assumed that the boarding-out of pauper lunatics is likely also to have good results. The lunatic colony at Gheel, the boarding-out at Kennoway and other places in Scotland, are each in their way interesting and encouraging experiments. The system, as tried to a very limited extent around the Sussex County Asylum, and at other places in England, has not been without good results; and it must not be forgotten that there are in England upwards of 6000 out-door pauper lunatics, or upwards of 7 per cent. of the total number of the insane, mostly living with relatives, and receiving weekly relief from the guardians out of the poor rates; but that it will ever be in Australia a method of providing for any large number of the insane, I very much doubt. I do not propose to discuss the question at length, as it is the subject of separate notice in a paper by Dr. Beattie Smith, but I would point out that with children there is increasing growth, increasing usefulness, increasing intelligence, to appeal to the feelings of their foster parent; whilst with the lunatic, there is none of these things, and the conditions are altogether different.

To subsidise, assist, and encourage the friends of the chronic insane to keep them at home, or to remove them from hospitals when fit for such removal should, I believe, be part and parcel of our asylum system, and in time I believe a very considerable number will be kept in their homes by means of State, parochial, or municipal aid; but whilst wages are high, and there is much scope for active employment, the number will not be large.

The antecedent conditions which have rendered Gheel and Kennoway possible—a large waste of poor land, and a miserably poor proprietary who are glad of the added pittance to eke out their want of means—are things which none of us can wish to see in Australia. The well-to-do condition of our working classes renders the boarding-out of the insane (by which I mean paying strangers to receive and take care of them in their homes), at present at all events impracticable, even if it were desirable; whilst the absence of village life, the isolated dwellings, the sparse population, the special dangers and difficulties of "bush" life, and the impossibility of effective medical or parochial supervision, all stand in the way of an adoption of the system, except in very special and occasional cases.

The separation of the idiotic and imbecile from the insane, both by legislative enactment, as I have already indicated, and by the provision of special institutions in which they can be trained and taught, is a matter of very considerable importance, and will, I have no doubt, be undertaken in all the colonies as soon as the number of these patients in each justifies the expense necessary for the special provision. The memorandum of the Committee of the Charity Organisation Society, agreed to at meetings held in London in 1877, has been virtually adopted by all who have thought on, and worked at, this subject.

In a few more years, when the number of the criminal insane has increased, the wisdom of making provision for this class in separate buildings, if not in separate establishments, will, I have no doubt, be acknowledged and acted on in all the Australian Colonies, as it has been in England, Scotland, Ireland, in the State of New York, and in New South Wales, and provisionally in Victoria and Tasmania. The further question arises, whether such provision should be in connection with the Lunacy or the Penal Department. Those patients who are acquitted on the ground of insanity, who are insane first, and whilst insane and irresponsible, commit criminal acts, may fairly and properly be placed in wards or establishments in connection with the Lunacy Department; but so far as I can understand there are no valid reasons why arrangements should not be made for the treatment of those who become insane whilst undergoing sentence—who are criminal first, and insane afterwards—in connection with the Penal Department. When prisoners undergoing sentence suffer from bodily ailment, they are treated in properly provided hospitals in the prisons. Why should not provision be made in prisons also for those suffering from mental ailments and brain diseases? Suitable buildings should not be difficult to provide. The prison surgeon should be as well qualified to treat diseases of the brain as of other organs, and the gaol warder has special qualifications for dealing with this special class. The transfer and re-transfer of these patients from the Penal to the Lunacy Department is a constant difficulty and trouble, the system leads to malingering and to numerous other difficulties in both departments, and it tends to make our asylums into prisons. The practical wisdom of the Scotch has solved the question by establishing wards for criminal lunatics in connection, not with an asylum, but with the general prison at Perth; and an interesting experiment at Woking Prison in England, where all the insane convicts have been kept during the last 11 years, has been reported on at length by Dr. Gover in an appendix to the report of the Director of Convict Prisons for 1885–86, and has proved a substantial and gratifying success.

The most desirable and necessary onward step, as it appears to me, is a more extended, larger, and more accurate scientific study of insanity.

More extended with regard to the medical profession at large. Larger, more accurate and scientific, so far as those especially engaged in asylum work are concerned. I think I am not over-stating the question when I say, that not half of the medical practitioners in Australia—aye, and in Great Britain also for that matter—have ever attended a lecture on, or made any study of, mental diseases. In the great Medical School forming part of the University of Edinburgh, although there is a lecturer on insanity—in every way a master in his specialty—attendance on his lectures is not compulsory, and he is not permitted to set a single question in the examination papers for the degrees granted by the University. Most of the London Medical Schools have lecturers, but attendance as at Edinburgh is voluntary, and the licensing bodies make psychological medicine no part of their examination. It is quite natural that with so many things a student must know, he holds in light esteem those things about which he may or may not trouble himself at his discretion, and the study of mental phenomena occupies the attention, therefore, of only a few of the more thoughtful students. At some medical schools, no provision is made for teaching the subject, and the result is, that the overwhelming majority of medical practitioners can, and do, obtain their diplomas to practise without having attended a lecture, or answered a question on the subject of mental diseases, seen the inside of a lunatic asylum, or examined a person of unsound mind, except in connection with some physical ailment, as in the delirium of fever. It is only a necessary consequence of this, that abnormal mental processes in their beginnings, slight deviations from mental health—insanity in its most remediable stage—are too often unrecognised and untreated ; and when recognised, too often regarded as disorders of the intellect rather than diseases of the brain, and held to be beyond the ordinary resources of mental science. It is a consequence also, that the medical profession as a body takes but little interest in insanity, and that medical practitioners as a rule consider their duty with regard to it to consist in the somewhat perfunctory signature of medical certificates. But more important than all, a host of neurotic individuals become insane, who under proper care need never pass the boundary line, and numerous individuals who under proper advice might keep sane, break the laws of mental health, with disastrous results to themselves and their offspring. The young Universities of Sydney and Adelaide have very wisely insisted that the study of psychological medicine shall form a compulsory part of the curriculum for their degrees, and that all candidates shall be examined in this subject. The University of Melbourne has, as yet, taken no steps in this direction, but I cannot believe that its medical graduates will much longer be untaught and unexamined on this important branch of scientific

medicine. In this connection, and for other reasons which I cannot now enter on, I regard the proposal to remove both the hospitals for the insane from the neighbourhood of Melbourne, and therefore from the neighbourhood of the University, as wanting in wisdom and forethought. The Metropolitan Hospital for the Insane should be in a manner affiliated to the University, and should be a school of practical teaching, and believe me such teaching will be fraught with the highest good, not only to the students, but to the medical officers of the hospital; will give them a renewed interest in their work, and will lead to a more accurate and systematised knowledge of their subject. I believe that the time is not far distant when all the medical officers of our hospitals for the insane will be engaged in clinical teaching and demonstration, and when arrangements will be made for the assistant-medical officers' appointments to be held for limited periods by our newly-fledged graduates. There is yet another step—and one I have for some years held in hopeful view—to complete a system of alienistic medical training, so as to procure an adequate supply of competent and efficient candidates for the various positions in our asylums and other medical offices in the public service, as well as to advance practical psychiatry and to diffuse a better knowledge of insanity throughout the profession of medicine, and this is the establishment in connection with our chief hospitals for the insane of a system of clinical clerk or assistantships. These positions, corresponding to those of "interne" in continental hospitals, should have a tenure of from six to twelve months, and carry with them residence, with adequate provision for board and attendance. Such a system is in force in several of the hospitals for the insane in the United Kingdom, notably at Bethlem, the West Riding, and at Edinburgh. It has been tried, with great promise of public utility, under the administration of Dr. Workman, in Ontario; and the Minister for Public Instruction in Italy, to his honour and to that of the Italian Government, some time ago initiated a complete and liberal scheme of this kind in connection with the University of Modena, under the direction of Professor Tamburini, the medical director of the asylum of Reggio Emilia.

In advocating a larger, more accurate, and scientific study of insanity by all specially engaged in asylum work, I am bound to point out that we have hitherto, at all events till lately, worked too much within the trammels of a somewhat narrow specialism. We have regarded insanity as standing apart from other diseases, we have gravitated so to speak round psychology, and it is only of comparatively late years that we have recognised that diseases of the cerebrum are only a part of the great subject of diseases of the nervous system. The very name of this Section of our Congress is in a measure evidence of this; and I would

suggest that at our future meetings a Psychological and Neurological Section would be a more fitting appellation in relation to the ground which we desire to cover. By the study of general paralysis, which is a disease not only of the brain, but of the whole nervous system, by the ascending course of some diseases of the spinal cord, by which ataxic and paraplegic subjects become dements, by examples of general sclerosis of the nervous tissue and other affections, we are being shown the intimate correlation of disease; and the study of cause and effect is demonstrating to us that if a large part of our insanity is not absolutely caused by diseases of other organs, there is no single part of the economy, lesions of which may not bring about psychical disorder in pre-disposed subjects. We are beginning to understand, but as yet we are far from an accurate and scientific knowledge of what may be called the alternations of neuroses, that though neurotic manifestations may be different in the individual, and interchangeable by inheritance from generation to generation, they are practically of one family and essence. In truth, as has been well said by a recent writer, "We have crossed the threshold of the great temple of mind, but we know little of the inner sanctuaries." This knowledge can only come by adding to our empirical work and observations a scientific comparative study of the homologies of disease.

That the study of insanity has not heretofore been as scientific and accurate as is desirable, is not the fault of the medical officers of hospitals for insane in Australia. They are overweighted and over-burdened with other work, and until their number is increased in proportion to the patients under their charge, they cannot undertake the pathological, the microscopical, and the scientific therapeutical work which should be steadily progressing in every hospital.

I believe that the large majority of those engaged in the care and treatment of the insane are duly impressed with the advantage, nay the necessity of systematic and varied amusements as an aid in curative treatment; and the increasing percentage of patients actively and usefully employed in our asylums shows that the value of employment towards the same end is duly appreciated.

The importance of a generous dietary, indeed of a wise liberality in the matter of food is fully recognised, and not a few of us are disciples of the "gospel of fatness," so ably and eloquently preached by Dr. Clouston; but I believe there are some curative agents which are neither as fully nor as wisely employed as they should be, and which it behoves us to use with greater accuracy, greater care, and greater method. And first, as to drugs. Medical men, and those practising our specialty in common with the rest of the profession, have become only too often sceptics in medicine, as well as in religion; and to quote a distinguished

American alienist, they "give their physic as they say their prayers—without expecting any immediate or any literal answer." Now I would deprecate this mental attitude, aud urge a more liberal and more accurate, and in some cases a more continuous employment of drugs. Considering the immense importance of sleep, do we study sufficiently the old vegetable neurotics and their alkaloids, and the newer chemical compounds, in regard to their action and their dosage with the view of producing sound and yet harmless sleep? Do we not fail in many of the cases in which we do employ sedatives, because we measure out inadequate quantities to calm the excitement of mania, or the distress of melancholia? Considering the marked trophic changes in many forms of insanity, do we employ the alteratives, such as arsenic and the milder mercurials, the alkaline salts, and the nervine and vaso-motor tonics and stimulants, with sufficient discrimination, and for sufficient periods of time? Considering the marked dryness of hair and skin, and the malodorous character of the cutaneous secretions, is our knowledge or our practice of hydro-therapeutics either creditable or satisfactory? Is the Turkish bath employed either as frequently or as fully as it might and should be, and is our use of simple or medicated baths carried out even to the full scope of the means at our command? The physical inaction of a number of the insane, especially in some of the forms of mental stupor and dementia, points to massage as a curative agent, as yet too little used and understood in our specialty. The obvious relation of electricity to nervous force, and the extreme sensitiveness of our patients to electrical change, as evidenced by increased excitement and noise, and by more frequent and severe epileptic fits during times of electrical and atmospheric disturbances, are well known. The influence of electricity on some of the more obscure nutritive changes is recognised, and the treatment of some forms of insanity by the continuous current has been more than favourably reported of. But has galvanism been with us thus far, except in a few instances, much more than a scientific toy?

There is surely much for us to do in this and in other directions I have indicated, towards the scientific treatment of insanity. Among other things, our hospitals should be great fields for brain surgery, the brilliant results attending which are of the highest interest and importance. Another direction in which I anticipate progress, is the systematic training of attendants and nurses for their special duties. This training should include a knowledge of general, as well as special nursing, and to this end the general hospitals should render us assistance by receiving for definite periods our attendants and nurses for training on their Staff. So far, the system is as yet in its infancy in these colonies; but Dr. Sinclair and Dr. Ross, who have been working for

...nd, on 31st December, 1887.

Proportion of Insane to Population.		
Male.	Female.	Total
1 in 370, or ·69 per 1000	1 in 326, or 3·06 per 1000	1 in 346, or 2·88 per 1000
..	..	1 in 343, or 2·91 per 1000
..	..	1 in 316, or 3·16 per 1000
..	..	1 in 342, or 2·92 per 1000

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Year.	Colony.
1887	New South Wal...
1887	Victoria 78
1887	South Australia ...94
1887	Queensland ...82
1887	Tasmania ...56
1887	Western Australia ...21
	Total Australia (except Western) ...81
1887	New Zealand
1886	England ..

Percentage.

Male.	Female.	To...
7·31	10·40	8·
0·65	8·08	9·
4·01	12·15	13·
6·31	9·06	7·
8·80	7·64	8·
8·98	21·42	19·
9·32	9·39	9·
5·76	12·92	14·

TABLE I

Showing Population of Australasian Colonies and the number of the Registered Insane on 31st December, 188[illegible], together with the Proportion of Insane to Population at that date, and on 31st December, 188[illegible].

Year of Census	Colony	Population 31st December, 18[illegible] Male	Female	Total	Number of Insane 31st December, 188[illegible] Male	Female	Total	Proportion of Insane to Population 31st December, 188[illegible] Male	Female	Total	Proportion of Insane to Population 31st December, 18[illegible] Male	Female	Total
1888	New South Wales	574,012	468,907	1,042,919	1,735	1,086	2,821	3·03 per 1000, or 1 in 330	2·32 per 1000, or 1 in 431	2·71 per 1000, or 1 in 369	3·13 per 1000, or 1 in 319	2·29 per 1000, or 1 in 435	2·76 per 1000, or 1 in 362
1881 (Census)	Victoria	550,050	486,060	1,036,110	1,886	1,633	3,519	3·42 per 1000, or 1 in 291	3·35 per 1000, or 1 in 297	3·39 per 1000, or 1 in 294	3·68 per 1000, or 1 in 271	3·01 per 1000, or 1 in 332	3·36 per 1000, or 1 in 296
18[illegible]	South Australia	168,336	154,952	323,288	421	329	750	2·50 per 1000, or 1 in 400	2·12 per 1000, or 1 in 471	2·31 per 1000, or 1 in 431	2·11 per 1000, or 1 in 473	1·92 per 1000, or 1 in 523	2·01 per 1000, or 1 in 496
18[illegible] (Census)	Queensland	214,531	152,404	366,940	551	320	871	2·58 per 1000, or 1 in 387	2·10 per 1000, or 1 in 476	2·38 per 1000, or 1 in 419	2·03 per 1000, or 1 in 491	2·08 per 1000, or 1 in 479	2·0[illegible] per 1000, or 1 in 487
18[illegible]	Tasmania	74,781	65,061	139,84[illegible]	193	157	350	2·58 per 1000, or 1 in 387	2·41 per 1000, or 1 in 414	2·50 per 1000, or 1 in 399	3·78 per 1000, or 1 in 264	2·43 per 1000, or 1 in 411	3·1[illegible] per 1000, or 1 in 317
18[illegible]	Western Australia	24,807	17,681	42,488	79	42	121	3·18 per 1000, or 1 in 314	2·37 per 1000, or 1 in 421	2·84 per 1000, or 1 in 351	2·11 per 1000, or 1 in 472	2·78 per 1000, or 1 in 359	2·38 per 1000, or 1 in 419
	TOTAL ..	1,606,520	1,345,070	2,951,590	4,868	3,567	8,435	3·03 per 1000, or 1 in 330	2·65 per 1000, or 1 in 377	2·86 per 1000, or 1 in 349	3·0[illegible] per 1000, or 1 in 330	2·52 per 1000, or 1 in 396	2·80 per 1000, or 1 in 356
18[illegible]	New Zealand	347,598	297,912	645,[illegible]	1,053	642	1,695	3·03 per 1000, or 1 in 330	2·15 per 1000, or 1 in 464	2·63 per 1000, or 1 in 380	2·47 per 1000, or 1 in 404	1·66 per 1000, or 1 in 603	2·09 per 1000, or 1 in 479

TABLE II

Showing the Proportion of Insane to Population in England, Scotland, and Ireland, on 31st December, 1887.

Country	Population Male	Female	Total	Number of Insane Male	Female	Total	Proportion of Insane to Population Male	Female	Total
England* ..	13,931,792	14,697,212	28,628,804	47,601	35,042	82,643	1 in 370, or 2·69 per 1000	1 in 326, or 3·06 per 1000	1 in 346, or 2·88 per 1000
Scotland† ..	..	..	3,991,499	5,441	6,16[illegible]	11,60[illegible]	..	..	1 in 343, or 2·91 per 1000
Ireland‡ ..	..	..	4,837,352	7,681	7,582	15,263		..	1 in 316, or 3·16 per 1000
Total ..	.	.	37,457,655	60,726	48,789	109,515			1 in 342, or 2·92 per 1000

* Report of the Commissioners in Lunacy, England, for 1887.
† Report of the [illegible] Commissioners of Lunacy, Scotland, for 1887.
‡ Report of [illegible] Asylums, Ireland, for 1887.

TABLE III

Showing the Population of the Australasian Colonies, the Number of Patients admitted to the Asylums, and the Proportion of Admissions to Population for the 10 years, 1878 to 1887 inclusive.

Year	New South Wales Population	Number of Admissions to Asylums	Proportion to Population	Victoria Population	Number of Admissions to Asylums	Proportion to Population	South Australia Population	Number of Admissions to Asylums	Proportion to Population	Queensland Population	Number of Admissions to Asylums	Proportion to Population	Tasmania Population	Number of Admissions to Asylums	Proportion to Population	Western Australia Population	Number of Admissions to Asylums	Proportion to Population	Total Australian Colonies (except Western Australia) Population	Number of Admissions to Asylums	Proportion to Population
1878	693,74[illegible]	424	1 in 1,636	827,439	560	1 in 1,477	248,795	203	1 in 1,225	210,510	120	1 in 1,754	108,525	34	1 in 3,191	..	..	..	2,089,012	1,341	1 in 1,550
1879	734,282	440	1 in 1,668	840,620	585	1 in 1,437	254,460	195	1 in 1,330	217,851	133	1 in 1,638	111,208	53	1 in 2,098	..	..	.	2,163,421	1,406	1 in 1,538
1880	770,7[illegible]	476	1 in 1,618	860,067	547	1 in 1,572	267,573	223	1 in 1,200	217,054	145	1 in 1,483	113,645	36	1 in 3,15[illegible]	..	..	.	2,226,833	1,427	1 in 1,560
1881	781,265	494	1 in 1,581	882,232	544	1 in 1,621	286,424	199	1 in 1,439	226,968	132	1 in 1,719	117,314	48	1 in 2,444	.		..	2,291,103	1,417	1 in 1,619
1882	817,468	473	1 in 1,728	901,225	467	1 in 1,929	293,509	224	1 in 1,310	248,255	136	1 in 1,825	120,701	52	1 in 2,321	..	.	..	2,386,158	1,350	1 in 1,767
1883	862,346	476	1 in 1,826	931,790	480	1 in 1,941	310,967	213	1 in 1,497	287,475	160	1 in 1,796	124,350	47	1 in 2,645	..	..	.	2,524,802	1,376	1 in 1,834
1884	921,12[illegible]	493	1 in 1,868	961,276	547	1 in 1,757	318,400	209	1 in 1,523	309,913	175	1 in 1,770	128,480	65	1 in 1,977	.	.	..	2,638,998	1,489	1 in 1,772
1885	980,57[illegible]	567	1 in 1,729	991,869	519	1 in 1,911	314,760	219	1 in 1,640	326,916	221	1 in 1,479	132,160	58	1 in 2,278	..	.	..	2,7[illegible]1,263	1,584	1 in 1,737
1886	1,030,762	567	1 in 1,817	1,003,043	595	1 in 1,687	318,785	207	1 in 1,540	342,614	205	1 in 1,671	135,701	42	1 in 3,226	..	.	..	2,830,705	1,616	1 in 1,751
1887	1,042,919	532	1 in 1,960	1,036,110	657	1 in 1,577	323,288	192	1 in 1,683	366,940	241	1 in 1,568	139,815	5[illegible]	1 in 2,470	.	..	..	2,909,102	1,674	1 in 1,738
TOTAL	8,641,97[illegible]	4,942	1 in 1,749	9,240,611	5,499	1 in 1,680	2,936,770	2,084	1 in 1,411	2,752,496	1,661	1 in 1,657	1,231,695	494	1 in 2,4[illegible]	..	..	..	24,813,487	14,680	1 in 1,690

TABLE IV

Showing the Nativity of the Patients under Care in Australasian Asylums during the year 188[illegible].

Nativity	New South Wales Male	Female	Total	Percentage Male	Female	Total	Victoria Male	Female	Total	Percentage Male	Female	Total	South Australia Male	Female	Total	Percentage Male	Female	Total	Queensland Male	Female	Total	Percentage Male	Female	Total
Born in the Colony or other British Colonies	588	458	1046	24·47	35·70	31·91	454	330	784	19·02	18·31	18·70	101	90	191	20·1[illegible]	21·09	20·73	92	39	131	13·98	10·08	12·54
Do Great Britain: England and Wales	524	277	801	26·2[illegible]	21·59	24·[illegible]	377	417	794	20·90	16·50	18·93	198	134	332	37·17	33·25	35·47	177	97	274	26·90	25·06	26·22
Do Great Britain: Scotland	100	60	160	5·01	4·68	4·88	160	147	307	7·01	7·69	7·52	42	31	73	7·88	7·69	7·80	57	30	87	8·66	7·75	8·32
Do Great Britain: Ireland	485	437	922	21·31	34·[illegible]	28·13	494	562	1056	21·6[illegible]	29·41	25·19	104	130	234	19·51	32·26	25·00	170	179	349	25·84	46·25	33·40
Do France	14	5	19	0·70	0·39	0·58	12	..	12	0·52	.	0·29	3	1	4	0·57	0·25	0·42	1		1	0·15	..	0·09
Do Germany	67	14	81	[illegible]	1·09	2·47	49	26	75	2·15	1·36	1·79	42	22	64	7·88	5·46	6·81	50	25	75	7·60	6·46	7·18
Do China	78	.	78	3·91		2·38	99		99	4·34	.	2·36	6	..	6	1·12	.	0·65	40	..	40	6·08	.	3·83
Do other Countries*	139	32	171	6·97	2·49	5·22	557	509	1066*	24·41	26·64	25·42	29		29	5·44	.	3·09	71	17	88	10·79	4·40	8·42
Total ..	1995	1283	3278	100·00	100·00	100·00	2282	1911	4193	100·00	100·00	100·00	534	403	93[illegible]	100·00	100·00	100·00	658	387	1045	100·00	100·00	100·00

Nativity	Tasmania Male	Female	Total	Percentage Male	Female	Total	Western Australia Male	Female	Total	Percentage Male	Female	Total	Total Australian Colonies Male	Female	Total	Percentage Male	Female	Total	New Zealand Male	Female	Total	Percentage Male	Female	Total
Born in the Colony or other British Colonies	89	51	140	38·87	24·55	32·83	15	10	25	15·46	22·22	17·61	1427	983	2410	22·90	23·44	23·12	92	68	160	8·74	10·59	9·44
Do Great Britain: England and Wales	72	15	87	31·44	8·98	21·97	39	9	48	40·21	20·00	33·80	1487	849	2336	25·67	20·25	23·38	375	210	585	35·61	32·71	34·51
Do Great Britain: Scotland	14	14	28	6·11	8·38	7·07	3	2	5	3·09	4·44	3·52	376	284	660	6·49	6·77	6·61	166	116	282	15·76	18·07	16·64
Do Great Britain: Ireland	43	19	62	18·78	11·38	15·66	24	21	[illegible]	24·74	[illegible]	33·80	1320	1351	2671	22·78	32·20	26·74	266	206	472	26·26	32·09	27·85
Do France		.			.	..	..	..	..	..			30	6	36	0·52	0·14	0·36	8	6	14	0·76	0·93	0·82
Do Germany	..	1	1	.	0·60	0·25	2	..	2	2·06		1·41	210	88	298	3·62	2·10	2·98	24	9	33	2·28	1·40	1·95
Do China	2	..	2	0·87	..	0·50	8	..	8	8·25		5·63	233		233	4·02	.	2·33	26		26	2·47	..	1·53
Do other Countries*	9	77	86*	3·93	46·11	21·72	6		6	6·19		4·23	841	635	1476	14·00	15·13	14·48	96	27	123	9·12	4·21	7·26
Total ..	229	167	396	100·00	100·00	100·00	97	45	142	100·00	100·00	100·00	5794	4196	9990	100·00	100·00	100·00	1053	642	1695	100·00	100·00	100·00

* [illegible]

TABLE V.

Showing the Recovery and Death Rate in Australian Asylums for the Year 1887, and for the Decennial Period ending 31st December, 1887.

		New South Wales			Victoria			South Australia			Queensland			Tasmania			Western Australia			Percentage for all Australian Colonies (except Western Australia)			New Zealand		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Percentage of Recoveries on Admissions and Re-admissions	For the year ending Dec. 31, 1887	44·63	49·50	40·22	37·60	17·24	41·85	30·8	26·7	29·2	41·00	57·30	46·88	22·85	8·33	16·94	..	..	..	35·82	45·44	39·66	[illegible]	48·75	4·61
Percentage of Patients Relieved on Admissions and Re-admissions	For the year ending Dec. 31, 1887	3·31	7·00	4·69	1·65	0·68	1·21	20·5	28·0	23·4	2·6	9·5	2·13	8·57	25·00	15·27	..	..	..	4·77	6·72	5·55	9·11	8·12	8·91
Total percentage of Patients Recovered and Relieved on Admissions and Re-admissions	For the year ending Dec. 31, 1887	47·94	56·50	44·91	39·23	17·92	43·06	51·3	54·7	52·6	43·6	60·00	49·01	31·42	33·33	32·21	..	..	..	40·59	52·16	45·22	49·80	56·87	52·52
Percentage of Recoveries on Admissions and Re-admissions	For decennial period ending Dec. 31, 1887	41·10	41·19	41·25	41·01	49·13	44·51	42·7	32·4	38·6	42·63	48·98	45·00	28·16	25·60	27·08	..	.	.	41·06	44·61	42·09	29·18	31·97	31·20
Percentage of Patients Relieved on Admissions and Re-admissions	For decennial period ending Dec. 31, 1887	5·64	9·21	6·98	2·69	2·18	2·47	13·8	29·0	19·8	3·56	5·47	4·22	9·85	17·87	13·23	..	..		5·58	9·04	6·97	7·57	10·06	8·65
Total percentage of Patients Recovered and Relieved on Admissions and Re-admissions	For decennial period ending Dec. 31, 1887	46·74	50·73	48·23	43·70	51·31	46·98	56·5	61·4	58·4	46·19	54·45	49·22	38·01	43·17	40·31	..	..	..	46·65	52·68	49·07	36·75	[illegible]	39·85
Percentage of Deaths on average number Resident	For the year ending Dec. 31, 1887	6·61	7·03	6·79	8·91	5·40	7·30	12·4	10·1	11·4	6·87	6·09	6·58	12·24	0·67	7·24		..	..	8·40	6·24	7·42	7·15	4·40	6·13
Percentage of Deaths on average number Resident	For decennial period ending Dec. 31, 1887	7·13	5·52	6·72	8·57	5·25	7·11	10·2	7·5	9·0	6·42	4·93	5·82	10·78	5·22	8·00	.	..	.	8·19	5·52	7·09	6·85	4·16	5·94

TABLE VI.

Showing the Classification of the Insane in the Australian Colonies on 31st December, 1887.

Colony		Idiots and Imbeciles (Including all cases of undeveloped intellect, congenital or acquired.)			Percentage			Criminals (Including all serving sentences, awaiting trial, or detained during the Governor's pleasure.)			Percentage			Convicts (Still at the charge of the Imperial Treasury)			Percentage			Ordinary Insane (Not included under either of the foregoing heads.)			Percentage			Totals			Deemed Curable	Percentage	Deemed Incurable	Percentage	Total
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total					
New South Wales	..	127	113	240	7·31	10·40	8·50	53	9	62	3·05	0·82	2·19	15	3	18	0·86	0·27	0·63	1,540	961	2,501	88·76	88·48	88·65	1,735	1,086	2,821	521	18·46	2,300	81·53	2,821
Victoria ..	..	201	132	333	10·65	8·08	9·46	39	8	47	2·06	0·48	1·33	..	..	..	..	..	..	1,646	1,493	3,139	87·27	91·42	89·20	1,886	1,633	3,519	319	9·06	3,200	90·93	3,519
South Australia	..	59	40	99	14·01	12·15	13·20	78	19	97	18·52	5·57	12·93	..	..	..	..	..	..	284	270	554	67·45	82·06	73·86	421	329	750	199	26·53	551	73·46	750
Queensland ..	..	35	29	64	6·31	9·06	7·32	11	2	13	1·98	0·62	1·48	..	..	..	..	..	..	508	289	797	91·69	90·31	91·18	554	320	874	94	10·75	780	89·24	874
Tasmania ..	..	17	12	29	8·80	7·64	8·28	26	11	37	13·47	7·00	10·57	35	..	35	18·13	..	10·00	115	134	249	59·58	85·35	71·14	193	157	350	43	12·28	307	87·71	350
Western Australia	..	15	9	24	18·98	21·42	19·83	2	1	3	2·53	2·38	2·47	30	..	30	37·97	..	24·79	32	32	64	40·50	76·19	52·89	79	42	121	12	9·91	109	90·08	121
Total ..	..	454	335	789	9·32	9·39	9·35	209	50	259	4·29	1·40	3·07	80	3	83	1·64	0·08	0·98	4,125	3,179	7,304	84·73	89·12	86·59	4,868	3,567	8,435	1,188	14·08	7,247	85·91	8,435
New Zealand .	..	166	85	249	15·76	12·92	14·69	47	12	59	4·46	1·86	3·48	..	..	..	..	..	..	840	547	1,387	79·77	85·20	81·82	1,053	612	1,695	..	..	..	..	

TABLE VII.

Showing the number of Epileptics and General Paralytics admitted into Australian Asylums during the Year 1887, and into English Asylums during the year 1886, with the Proportion (per cent.) to the total number admitted.

Year	Colony	Total Number of Patients Admitted			Of this Number of Patients Admitted: Number of Epileptics			Number of General Paralytics			Proportion (per cent.) of Epileptics and General Paralytics Admitted to the Total Number of Patients Admitted: Epileptics			General Paralytics		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1887	New South Wales .	321	194	515	28	14	42	14	1	15	8·7	7·2	8·1	4·3	0·5	2·9
1887	Victoria	490	345	835	27	20	47	8	..	8	5·5	5·7	5·6	1·6	..	0·9
1887	South Australia	116	91	207	4	5	9	3	2	5	3·4	5·4	4·3	2·5	2·1	2·4
1887	Queensland .	132	73	205	6	6	12	2	..	2	4·5	8·2	5·8	1·5	..	0·9
1887	Tasmania . ..	35	24	59	3	2	5	1	..	4	8·5	8·3	8·4	11·4	..	6·7
1887	Western Australia .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total Australian Colonies (except Western Australia) ..	1,099	727	1,821	68	47	115	31	3	34	6·2	6·4	6·3	2·8	0·4	1·8
1887	New Zealand ..	255	161	416	9	3	12	11	1	12	3·5	1·8	2·8	4·3	0·6	2·8
1886	England	6,712	6,912	13,624	710	522	1,232	964	213	1,177	10·5	7·5	9·0	14·3	3·0	8·6

TABLE VIII.

Showing number of Patients, and number of General Paralytics admitted for five years, 1883 to 1887 inclusive, to Institutions for the Insane, New South Wales.

Year	Total No. of Patients Admitted			Total No. of General Paralytics Admitted			Per Cent. of General Paralytics		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1883	278	178	456	15	3	18	5·3	1·6	3·9
1884	294	186	480	19	..	19	6·4	..	3·9
1885	332	220	552	14	1	15	4·2	0·4	2·7
1886	356	194	550	18	3	21	5·0	1·5	3·8
1887	321	194	515	14	1	15	4·3	0·5	2·9
Total for 5 years	1,581	971	2,552	80	8	88	5·0	0·8	3·4

Showing number of Patients and number of General Paralytics admitted for five years, 1882 to 1886 inclusive, to English Asylums.

Year	Total No. of Patients Admitted			Total No. of General Paralytics Admitted			Percentage of General Paralytics		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1882	6,663	6,918	13,581	923	228	1,151	13·8	3·2	8·5
1883	7,017	7,441	14,458	918	212	1,130	13·1	2·8	8·0
1884	7,075	7,233	14,308	986	206	1,192	13·9	2·8	8·3
1885	6,445	6,813	13,258	952	223	1,175	15·0	3·2	8·9
1886	6,712	6,912	13,624	964	213	1,177	14·3	3·0	8·6
Total for 5 years	33,812	35,317	69,129	4,743	1,082	5,825	14·0	3·1	8·4

Z[illegible]ALAND.

emale.	Total.
48·75	43·61
8·12	8·91
56·87	52·52
34·97	31·20
10·36	8·65
45·33	39·85
4·40	6·13
4·16	5·94

Deemed Incurable.	Percentage.	Total.
,300	81·53	2,821
,200	90·93	3,519
,551	73·46	750
,780	89·24	874
,307	87·71	350
,109	90·08	121
,247	85·91	8,435
..	..	..

two years at Gladesville, are more than gratified with the result, which to my mind is most satisfactory. The effort to improve the qualification of those in immediate attendance and care of patients, promises great benefit to the insane; and I am making no rash prediction in saying that, within another decade, no attendants nor nurses will be employed in State Hospitals for the insane in these colonies, except as probationers, who have not gone through a systematic course of training and instruction in their duties, and received certificates of their fitness for their special work.

Did time permit, I might go on to indicate some of the hindrances, the troubles, and difficulties which are known only to those who are engaged in lunacy work, but I should serve no practical purpose. Insanity, though a most interesting, will always be an unpopular subject, and one in which little or no outside interest will come to our aid. Most of the progress which I have indicated must come from within rather than from without, and though I believe that the care and treatment of the insane, and our knowledge of insanity, will steadily improve, and a more intelligent interest arise in our work, especially among the members of the medical profession, we shall in the future, as in the past, in only too many cases, and for some years to come, have to do perforce of circumstances what is expedient or possible, instead of what is right and best, and to be content, or as content as we can, with an attainable good, instead of an unattainable better.

See Tables.

A CASE OF SPORADIC CRETINISM, WITH REMARKS.

By F. Norton Manning, M.D.

Inspector-General of the Insane, N.S.W., and Lecturer on Psychological Medicine at the University of Sydney.

The case I am about to describe is one of a somewhat rare disease—rare, at all events, in Australia, since it is the first and only one I have seen in an experience of twenty years, and not very common in Great Britain, though I have been able to find more or less full notes of twenty-six cases. In addition to these, I find two cases described by M. Baillarger as having occurred in France.

S. G. was admitted into the Hospital for Idiots and Imbeciles at Newcastle, N.S.W., in April 1888, and I obtained the following history from her father, who I may mention is a somewhat squat ugly Irishman, of quite average intelligence, and comes of decent stock in the West of Ireland:—He did not leave home till he was thirty years of age, and knew his own and his wife's people up to the grandparents on both sides. He states confidently that there has been no insanity, idiocy, or epilepsy on either side, and describes his wife, who died about three months before the patient's admission to hospital, as a "very fine healthy woman." The patient is the last but one of six children, all the rest of whom are well-formed, healthy, and show no mental failure, and three of whom are married. The father describes himself as a sober, steady man, and I have no reason to doubt his statements. There is no history of syphilis. The patient was born in Armidale, N.S.W., and is now eighteen years of age. She appeared healthy at birth; at all events, the parents were not conscious of anything wrong with her. At eight months old, she was thrown out of a perambulator. After this convulsions commenced, and continued occasionally till she was nearly three years old. They were not frequent, and were probably due to dentition. There have been no fits since. The idea that there was something the matter with the child appears to have dawned very gradually on the parents; but they were fully aware of her deficiencies before she was three years old, and the probability is that the malady, if not congenital, commenced early. She has lived for the last ten or twelve years in a suburb of Sydney, and was taken care of by her mother and sisters till the death of the former.

On admission.—She was an excellent and characteristic specimen of a cretin, or cretinoid idiot—a case of true sporadic cretinism. Her height was thirty-five inches, and her weight fifty-six pounds. The chest girth was twenty-eight inches. The figure was broad and squat, and there was considerable development of fat. The abdomen was protuberant, and the legs bowed and twisted. The arms measured fourteen inches from the tip of the acromion to the finger ends, and the hands were large and wrinkled, and aged-looking. There were no signs whatever of sexual development, the breasts being undeveloped and the pubes hairless. So far as could be ascertained, the thyroid

 

A CASE OF SPORADIC CRETINISM

(Dr. F. N. Manning's Paper.)

gland was absent, and above the clavicles were the peculiar fatty protuberances usually seen in these cases. The circumference of the head was twenty-two inches, and the vertical measurement from the insertion of one ear to the other, twelve inches. In shape it was brachy-cephalic, with considerable occipital protuberance. The face was flat and broad; the cheeks hanging and jowl-like, and the eyes set somewhat far apart; the mouth was always partly open, and the point of a large smooth flabby tongue visible; the lips were thick, and the nose flat and ill-formed. The palate was not markedly abnormal, and the teeth, though ill-shaped and decayed, were fairly regular. The ears were wing-like and large. The complexion was earthy and sallow, and the skin could not be pinched up from the subcutaneous tissue. The pulse was eighty-eight, and the temperature normal. The patient could walk, though in a peculiar waddling fashion, and could use both hands. The senses all seemed good, but perception was very slow. The speech was slow and monosyllabic, and indistinct, but she could say a number of words and tell the names of all ordinary articles about her. She recognised a penny, but called all silver coins without distinction a shilling; and though she knew that money would buy sweets, peaches and bananas, had no idea of relative value. She could count up to four only. Could tell her name and age, but no other particulars of her history. She was cleanly in habits, and attentive to the calls of nature, but could not dress herself. She was exceedingly amiable, easily amused, and strongly imitative.

The experience of some months has shown that she is teachable in only a very minor degree. She cannot be got to count above four, but she knows the routine of the establishment, and can tell the hours for meals, &c., if asked, and is very appreciative of kindness and fond of those who take notice of and pet her. Altogether, the intellectual development is extremely low in class.

Cretinism has been described as characterised by a lesion of the intellectual faculties more or less analogous to that observed in idiocy, and with which is associated a characteristic vicious conformation of the body—an arrest of development of the entirety of the organism.

These sporadic cases certainly conform to this definition, and to any-one who has travelled in the cretinous districts of Switzerland or the Himalayas, or has seen isolated cases of endemic cretinism in French or Italian hospitals for the insane, the resemblance of the sporadic to the endemic cases is most striking, and is such as to make them recognised at once as belonging to the same family. The more marked physical peculiarities of these cases are the arrest of development, which seems to occur generally at the period of the first dentition, but in one or two cases has been postponed until the seventh or eighth year, so that at 18 or 20 years of age they are physically children of from 5 to 7 years, and never attain to any sexual development—the peculiar squat conformation, the pallid earthy complexion, the wrinkled skin (especially of the hands), the brachy-cephalic crania, flattened noses, widely set eyes, thick lips and large flabby tongues, and lastly, the presence of supra-scapular swellings and the absence of the thyroid, which latter is difficult to diagnose during life. The mental condition is that of idiocy. The patients are extremely placid and good tempered, have often a sense of humour and fun, and are very imitative, but are

teachable only to a very limited extent. The speech is generally slow, thick, and monosyllabic. By attention and care. most of the cases can be made cleanly in habits and attentive to the calls of nature. The fatty tumours of the neck consist of general enlargements of the fatty deposits in this region; but they are not as a rule defined or encapsulated, but send out processes under the sterno-mastoids and clavicles. There is nothing peculiar in their constitution. They are simple fatty growths, and since they disappear in exhausting diseases and emaciation, are apparently a reserve stock of ordinary fatty material. They are rather in fact an anatomical curiosity, than interesting pathologically or physiologically, but at the same time they are very distinctive, and in some cases, notably in two described by Dr. Hilton Fagge, are most marked and peculiar, so as to constitute an absolute deformity. They are, with the absence of the thyroid, a constant distinctive feature between sporadic and endemic cretinism, being almost always present in the former, and never yet observed in the latter affection.

Before turning to the literature of the subject, it may be well to insist, first, that the disease is not related to either rickets or scrofula, though in some cases the limbs of the subjects have been bowed; second, that it is not inherited syphilis; and third, that it is not markedly the outcome of heredity, the parents for the most part being healthy folk, in no way consanguine. From the cases which have been published, it would appear that it may be, and indeed usually is, congenital, but that it is usually first noticed during the first dentition, though, as in cases reported by Dr. Fagge and Dr. Langdon Down, it occasionally, though rarely, seems to commence at a later age. In most of the reported cases there has only been one in a family, the other children being healthy; but three of Dr. Fagge's cases occurred in one family, the remaining children being quite free from the affection.

The first notice of the affection which I have been able to find is a paper in the "Med. Chir. Transactions for 1850," by Mr. T. Blizzard Curling, entitled, "Two cases of absence of the thyroid body, and symmetrical swellings of the fat tissue at the sides of the neck, with defective cerebral development." Mr. Curling gives the post-mortem appearances in both these cases, and in his brief remarks says, "It is highly probable that the abnormal secretion of fat was dependent on the absence of those changes, which result from the action of the thyroid, or from some imperfection in the assimilating process consequent on the want of the gland." In the "Med. Chir. Transactions for 1871" is a paper by Dr. Hilton Fagge, on "Sporadic Cretinism" occurring in England, in which four cases are described; and in the "Pathological Transactions for 1874" Dr. Fagge gives the post-mortem appearances of one of these four cases, and of a fifth case which came under his observation.

Dr. Langdon Down, in his recently published work "On the Mental Affections of Childhood and Youth," mentions that between 1850 and 1887, he has had twelve cases under his care, and M. Baillarger has placed on record notes of two. Dr. Fletcher Beach of the Darenth Asylum, has had seven or eight cases under his care; and in the "Transactions of the Pathological Society for 1874 and 1876" and the "Report of the International Medical Congress for 1881," has published the results of microscopic examination of five cases. I

had an opportunity of examining two of the cases under Dr. Fletcher Beach's care, in the Darenth Asylum, in 1887. In addition to these cases, instances of the disease have been mentioned by several writers. In all Dr. Fletcher Beach's post-mortems, the thyroid was absent, the tumours of the neck consisted of lobulated fat, and the convolutions of the brain were as a rule described as coarse, and their structure simple. On microscopical examination, the nerve-cells were somewhat large, rounded, or pyramidal in form, with round, oval or irregularly angular nuclei. Many of the cells had no processes, some only one or two, often three or four, but these stunted. The spaces around the cells were large, so as to produce a curious honeycombed appearance.

It is now advisable to ask, what is the essential character of this affection, and what is its cause? From the fact of almost all the cases first recorded, or at all events a large proportion of them having occurred in or near London, in the valley of the Thames, some telluric, miasmatic or climatic influence has been suggested; and it has been thought that a London lane or court, with its high walls, its want of light, its stagnant and vitiated atmosphere (bearing some resemblance to a narrow Swiss valley between the mountains), combined with poverty, bad food, and other causes (also common to the dwellers in Swiss valleys), may have determined the peculiar form of the degeneration; but certain of the cases, and among them the one I have described to you, have not been subject to these conditions.

Dr. Langdon Down states that, in the majority of the cases under his care, there was reason to believe that they were procreated during the intemperance of the father, and adds, "some of the later ones could not have been procreated under any other condition." In one or two other cases on record, it is stated on the authority of the mother, that the father was drunk at the time of the connection. Though drunkenness on the part of the father during procreation is a recognised cause of idiocy, there seems no reason why the idiocy should take this special form; and indeed, as a rule, it most certainly does not, and besides in some of the cases on record the parents were absolutely temperate people, and there was every reason to believe there had been no drunkenness during coitus.

M. Baillarger seems to regard the essential and primary part of the disease as residing in the generative organs, and opines that the inactivity of the generative system is responsible for the general condition.

Virchow believed that he had found the capital abnormality of the cretin in all his varieties in the premature ossification of the spheno-basilar bone, or to put it in his own words, "the premature synostosis of the two parts of the sphenoid bone, together with the basilar process," which prevents the elongation of the base of the skull, and consequently the development of the brain; and his articles in periodicals, and his separate work on this subject, are as solid and unamusing reading as you can find in medical literature.

Drs. Hilton Fagge and Fletcher Beach have, in their necroscopic examinations of sporadic cretinism, found that this peculiar premature ossification exists, but that it is the essential or capital abnormality is more than doubtful.

The most marked, constant, and distinctive peculiarity is the absence of the thyroid gland. This absence is total and complete, and has been found post-mortem in every case, except one of Dr. Fagge's in which the cretinoid condition was late in developing, and in this case the gland, though present, was extremely small and atrophied. We have no means of knowing whether this absence is accidental, primary and congenital, or is due to some changes, either intra-uterine or soon after birth, in the trophic centres, which prevent its development or lead to its early and complete absorption; but, as Dr. Fagge remarks, "it may be interesting to speculate whether this absence can possibly be the cause of the other changes which make up the morbid state."

In this relation, the disease known as myxœdema is interesting, since in every case of this there is atrophy of the thyroid, and an almost complete annihilation of the proper gland elements, which are replaced by a delicate fibrous tissue, this change being due either to a compression by the mucin deposited, or to disease of the trophic centres of the thyroid in the medulla. In this affection, as in sporadic cretinism, there are marked changes in the general nutrition, and the patients attain—in time—a colour, a general aspect, a condition of skin, and a flabbiness, which bear a peculiar resemblance to those of the cretin, whilst at the same time there are peculiar mental changes—a loss of mental power, a slowness of nervous perception and of speech, and a dull lethargic dementia, which has led some writers to speak of this condition as adult cretinism. So marked, indeed, is the resemblance between sporadic cretinism and myxœdema, that the Committee of the British Medical Association, presided over by Dr. Ord, have come to the conclusion "that a general review of the symptoms and pathology leads to the belief that the disease described under the name of myxœdema, as observed in adults, is practically the same disease as sporadic cretinism when affecting children, and that a very close affinity exists between myxœdema and endemic cretinism."

I would point out that the mental changes frequently accompanying Basedow's or Graves' disease—exophthalmic goitre—in which there is enlargement of the thyroid, with vascular turbgesence of that body, are also of interest; and I would also direct your attention to the physical changes in the rare disease known as acromegaly, two cases of which are described in the report of a meeting of the Clinical Society, held on April 13, 1888. In these cases, with enlargement of the thyroid, due to cystic disease involving its proper structure, there is an extraordinary disturbance of nutrition, as shown by a remarkable overgrowth of some parts of the bony skeleton, particularly of the bones of the face, the ends of the clavicles and ribs, and the small bones of the hands and feet, and also by a thickening of the subcutaneous fatty tissue, an increased coarseness of the skin itself, impairment of special senses, and marked general feebleness. The idea that absence of the thyroid is the starting point, or at all events the main pathological factor in sporadic cretinism, is further strengthened by the facts made known by Professor Kocher, of Berne, that after removal of the thyroid a condition gradually supervenes, which is called by him "cachexia strumipriva," and by Reverdin "myxœdème opératoire," and which resembles adult cretinism; and also by the appearance of symptoms resembling those of myxœdema after removal of the thyroid in monkeys

by Professor Horsley. Whilst absence or atrophy of the thyroid is a constant feature in sporadic cretinism, the fact of the association of endemic cretinism with the opposite condition of goitre is interesting, and as goitre is as a rule simple hypertrophy, or cystic fibroid, or fibro-cystic enlargement of the gland, some hypothesis by which the peculiar discrepancy can be explained is necessary. To this explanation Dr. Hilton Fagge devotes some attention in his paper in the "Medico-Chir. Trans. for 1871," which I have already mentioned. He points out first, that though goitre and cretinism co-exist in many cases, they bear no fixed proportion to each other. In the worst cretins, the thyroid body is often no larger than usual, whilst persons with enormous goitres are frequently well developed both mentally and physically; and he suggests that goitre is the earlier effect of endemic influence, and that cretinism only appears when this influence is intensified, and acts through more than one generation; that with little intensity the sole effect is goitre, but with great intensity, or after acting through successive generations, it produces cretinism as well as goitre. "It appears to me," he says, "that there is a certain antagonism between goitre and cretinism. When a large goitre exists, it may possibly have the power and effect of protecting against the more severe effects of endemic influence, and thus cretinism and goitre only co-exist when the exciting cause is present in intense degree, or has acted through several generations."

Accepting this explanation, the discrepancy vanishes. We have but to suppose that the healthy thyroid body is capable of so controlling nutrition, and of counteracting morbific climatic, miasmatic, or telluric influences that in most parts of the world—at all events, where the causes of endemic cretinism act only with a low degree of power—these causes are held in check, and we can see why a form of cretinism shows itself when the thyroid is atrophied or absent. We know so little positively of the physiology of the thyroid, that we can only speculate as to whether sporadic cretinism is due simply to the absence of this body, and some imperfection in the nutritive or assimilative processes consequent on such absence; or to the absence, plus some miasmatic or other morbific influence which, if present, it would have the power to counteract, as Dr. Hilton Fagge suggests; but arguing from myxœdema, and from Professor Kocher's observations, it seems probable that the former is the case. Under either supposition, sporadic cretinism is interesting pathologically, and in its physiological bearings.

A CONTRIBUTION TO THE STUDY OF SPORADIC CRETINISM. — SIX CASES OCCURRING IN SOUTH AUSTRALIA.

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Some years ago, I was consulted in reference to the two children whose cases stand first on the list which follows. I was at the time struck with the resemblance of the affection in many respects to myxœdema, with which I had become familiar through seeing in the first place some of the cases on which Dr. Ord's description was founded. And, in fact, I called the affection of these children myxœdema, though I had never heard of it occurring in such young subjects. On looking up the matter, I became acquainted with Dr. Hilton Fagge's paper on "Sporadic Cretinism occurring in England," in vol. liv. of the "Transactions of the Medico-Chirurgical Society;" but, being unable, as a medical adviser, to suggest either cause or remedy, I lost sight of the children until I heard from my friend Dr. F. Norton Manning, of Sydney, that he had a similar case which he intended bringing before the Intercolonial Medical Congress.

On this, I sought permission of the parents of the children in question to make a further study of them, as well as others of the family who were affected, which was readily granted. The following paper embodies the result. For the opportunity of investigating the last case on the list I am indebted to Dr. Verco, who was kind enough to bring it under my notice :—

The fact of five of the affected children being members of one family, obviously makes all questions of heredity of special importance. I therefore preface my report of the cases with an account of their parentage.

The father, æt. 43, is a rather short, but compactly built, strong, healthy and intelligent man of good social standing, occupying with ability a responsible position of trust. He has never suffered from any illness except periodic attacks of hay-fever, which affect him severely. There is no question as to his habits, which are at all times strictly temperate, and there is no history whatever of syphilis. He was one of a family of eleven, of whom two are dead. His father died at seventy-two of some bladder complaint, and his mother is still alive, being still well and strong at the age of seventy-one, but with some liability to rheumatism and bronchitis.

The mother, æt. 40, a native of South Australia—one of a family of eight, of whom two are dead—is a particularly bright, intelligent and cheerful woman of ordinary stature. Very spare and thin in her youth, she now inclines a little to a full habit. She has had no serious illness. Her father and uncle suffered from epilepsy, of which the former died. Both her grand-parents lived to a good old age.

These parents of the family now under consideration are not related, and have been married for twenty-three years, during which time eleven children have been born to them. There have been no miscarriages, no instruments were in any case employed at delivery, and none of the labours were difficult. Recovery afterwards was in

all cases very favourable, and there is no account of any shock or fright during pregnancy. All were born at the full term.

The following table indicates, in tabular form, the order, sex, and ages of their family, the affected members being indicated by the prefix of an asterisk, and as the family consists of two distinct types as regards the colour of the hair and eyes, I add these particulars also :—

No.	Sex.	Age.	Colour of Hair.	Colour of Eyes.
1	Girl	22 yrs.	Auburn, inclined to red	Greyish blue
2	Boy	Died from accident, would have been 20.	Dark brown	Dark brown
*3	Girl, L. M.	19 yrs.	Brown	Blue
*4	Girl, E.	17 yrs. 3 mths.	Dark brown	Blue
5	Boy	15 yrs. 5 mths.	Dark brown	Dark brown
*6	Boy, C. H.	13 yrs. 6 mths.	Dark brown	Brown
*7	Girl, J. L.	11 yrs. 1 mth.	Dark brown	Greyish blue
8	Boy	8 yrs. 1 mth.	Auburn, inclined to red	Greyish blue
*9	Girl, A. A.	6 yrs. 6 mths.	Red	Blue
10	Girl	3 yrs. 9 mths.	Very dark brown	Blue
11	Boy	1 yr. 4 mths.	Very dark brown	Very dark brown

No peculiar features of any kind can be distinguished in the unaffected members of the family, who appear perfectly bright and healthy in every way.

Between all those who are affected there is such a strong generic resemblance, that it will only be necessary for me to describe in detail the case of the eldest of the series, girl No. 3 in the preceding table, in whom the physical symptoms are most marked, though in respect of mental condition she stands at a higher level of intelligence than either the sister who immediately follows her, with whom, from the approximation of their ages, she can best be compared, or No. 9, who of course is much younger. I will then, in the case of the other affected members, merely state those particulars in which there are differences observable between them and the one (No. 3) recorded in full. Where no particulars are given, it is to be understood that the description of the first case applies.

Case I.

L. M., female, æt. 19 (the third child in the family series).

History.—She was born at the Reed-beds, a sandy but sometimes partially-flooded locality about four miles from Adelaide, and was from birth a fragile delicate child. She was weaned when about six months old, and was subsequently reared on cow's milk. At about that age, she had a moist eruption on the scalp. The first dentition occurred normally at the usual time, but there has been no succession of any of the second set. At the age of about four she was still thin and delicate, and about this period she had scarlatina and whooping cough, from which she appeared to recover completely. Shortly after this, however, a change in the child was noticed, which is described by the mother as a "sort of broadening of the face and hands," and at the same time the child became "podgy and heavy." Up to this date, her intelligence deve-

loped as in any ordinary child, but synchronously with the physical changes she became dull and inert, and this dulness increased as the bodily changes progressed. Even in her early thin and delicate days she was always very sensitive to cold, which peculiarity became more marked at the onset of the cretinoid symptoms.

Present Condition.—Height 3 ft. 4 in., weight 72 lbs. 14 oz.; fronto-occipital circumference of head 20½ inches, but its configuration presents no abnormality, and the fontanelles are closed, marked heaviness of the lower part of the face, giving the full face a pear-shaped outline. Eyes weak and watery-looking. Eyelids, especially the lower, swollen and puffy; palpebral conjunctiva slightly congested; irides blue, pupils slightly dilated. Hair brown, straight, wiry and coarse, but fairly thick, and does not come out. Scalp slightly inclined to scurfiness. Eyebrows and eyelashes rather thin. Bridge of nose broad. Cheeks full, but firm. Lips thick, everted and pouting, pale and glazed. There is a great want of mobility in the features which, with their puffy condition, cause great heaviness of the countenance. The skin of the face is soft and smooth, but the natural complexion is obscured by marked sun-burning. In spite of this, the general aspect, the feel, and a strong suggestion of semi-translucency in the features, remind one of myxœdema; but there is no pitting, even on firm pressure. The first set of teeth is persistent, with the exception of a few that have come out; those that remain are small, discoloured and worn, the upper incisors particularly being worn down to the level of the gum. The tongue is clean and moist, long and narrow, and there is no bad breath. Underneath the lower jaw there is a soft, puffy, roll-like swelling, presenting the appearance of a "double chin." Girth of neck, 13½ inches. The fulness of the neck makes it impossible to say whether the thyroid is present or not, but there is certainly nothing in the feel of the parts to make one at all confident of its absence. In each supra-clavicular region there is a soft, puffy, obscurely-circumscribed swelling, about the size of half a turkey's egg, or larger, which feels like fat, but shows no dimpling under the grasp. These, the mother states, were not noticed in the early stages of the disease, and she thinks they are now increasing in size. There is a general diffuse soft puffiness, as of subcutaneous fat, below the clavicles, apparently continuous with the supra-clavicular swellings, and extending downwards as far as the areolæ, and outwards as far as the anterior border of the axillæ, but not observable in the axillæ. Over this area, the superficial veins are conspicuously enlarged, especially over the upper part. The mammæ are ill-developed, and the nipples are small. The skin of the body is very harsh and dry, with a tendency to scaliness, and the mother states that she never perspires, even under the influence of a steam bath. There is a general puffiness over the whole body, but no pitting on pressure in any part of the trunk or limbs. Chest measurement, 29 inches. Respiratory sounds normal, and heard clearly over the supra-clavicular swellings. Heart sounds distant, but normal. Pulse 90, normal in character. The abdomen is swollen, prominent, and tympanitic, with apparently much subcutaneous fat. Girth at the umbilicus 33½ inches. She is stated to be very sensitive to the pressure of tightly-fitting clothes. From the percussion sounds, it is possible that the liver may be enlarged, but the general swelling of the belly

makes it impossible to speak with certainty. No hair on the pubes or in the axillæ. The hands are stumpy, broad, puffy, and cold, with their skin wrinkled and baggy, as if too large for them. Nails well developed. She is very slow and clumsy in the use of her fingers, and finds much difficulty in buttoning her clothes. Skin of hands and arms dry and harsh, having on the internal surface of the latter light brown patches, composed of aggregations of horny-looking papillæ. The feet are similarly puffy and cold, with the same dry harsh skin as the hands and arms; on the knees, there are patches of the same horny papillæ as were noted on the arms. There is no curving of the tibiæ, or any bone distortion in any part. The calves are large ($11\frac{1}{2}$ inches in girth) and firm. As she stands stripped, there is a considerable degree of lordosis which, with the large calves, remind one of pseudo-hypertrophic paralysis, but save for extreme sluggishness, there is no difficulty in rising from the recumbent position. She walks in an extremely leisurely way, with a waddling gait. In fact, extreme deliberation and sluggishness mark all her actions. Corresponding to the lower cervical and upper dorsal vertebræ, there is a diffuse soft, puffy, and elastic swelling, quite undefined, but extending over an area of about six inches in diameter, and over this surface there is a marked tendency to hairiness, which merges into the hairy scalp at the nape of the neck. The appetite is uncertain and capricious; the bowels regular, but easily upset by irregularities of diet and changes of weather. Micturition is frequent. Urine phosphatic, with trace of albumen.

She has never menstruated. The knee-jerk is completely absent, but she is quite sensitive to tickling of the soles. Temperature in the mouth, 97·4°. The special senses appear to be of normal acuteness, save for some weakness of the eyesight at night, probably due to the palpebral congestion. Her mental faculties may be summed up by saying that they are those of a dull child of five, and her mental operations are characterised by the same sluggishness that distinguishes her bodily movements. She can read children's stories, and is fond of being read to. She displays a great want of application, and experiences great difficulty in learning by rote. Her handwriting is neat, but very child-like. In disposition she is amiable but sensitive, and she realises she is not like other children. She does not speak much, and when she does, it is in short jerky sentences, but without any trace of ill-temper, and without expression. She is easily amused, and often laughs in a short spasmodic jerky fashion. Habits perfectly cleanly, and, according to her mother, she "sleeps like a top." The extremities are always cold and "frog-like," and she is extremely fond of basking in the sun, or in winter before the fire, when she will sit motionless for hours doing nothing, absolutely placid, contented and torpid.

Case II.

E., female, æt. $17\frac{1}{4}$ (No. 4 in the family series), was a remarkably fine and healthy child up to 4 years of age, about which time the symptoms as described in the preceding case made their appearance in the same way. At 7 years of age she had diphtheria, but has not had scarlatina. There is a history of some scalp eruption, which is described as commencing like a painful boil. There was always the same senitiveness to cold as in the preceding case.

Height 3 ft. 1½ in., weight 43 lbs., head girth 20½ in., chest girth 23½ in., umbilical girth 24½ in. The general description of the bodily signs of the preceding case apply with almost verbal accuracy to this one also, only it is to be understood that they exist to a less marked degree. There is however more scabbiness of the scalp, which looks like the remains of seborrhœa. The face is not nearly so broad or puffy, nor are the hands, but the skin of these members is more glazed and scaly, and has a parchment-like feel. The breath is in this case offensive. In consequence, probably, of the less bulky body, she can move about much more freely than her elder sister, and can even run a little, though she moves with the same kind of waddling gait, and a similar sluggishness characterises all her movements. On the other hand, there is much greater dulness all round of the intelligence, which is associated with greater immobility of the features. She has never learned to read, and speaks with more hesitancy, much indistinctness, and a slight lisp. She can write a childish but careful hand. In disposition she is amiable, but not sensitive like her elder sister. Temperature 99·8°.

Case III.

C. H., male, æt. 13½ (No. 6 in the family series), born at Woodville, a suburb of Adelaide; weaned at about 11 months. History of onset of symptoms similar, only they have never progressed to the same extent. There were no infantile diseases, and no scalp eruption. Height 3 ft. 8 in., weight 52 lbs. 10 oz., head girth 21 in., chest 24¾ in., abdomen 27 in. Exactly the same kind of symptoms are here present, but to a much less degree. The puffiness of the face is much less marked, but there is still distinct woodenness and want of expression in the features. The hair is much thinner than in the two preceding cases, leaving much bare scalp visible. From the distinctness with which the windpipe can be felt, it is possible the thyroid might in this case be absent. The supra-clavicular swellings are less prominent, but still very noticeable; and so with all the other physical signs. Temperature 98°.

Mentally, this boy is much in advance of his two elder sisters. He is fairly active, and attends the State School, where he plays with the other boys, but he cannot run fast. At home, he is useful and busy, and looks after the poultry or other domestic matters. He is very good-natured and amiable, slow at learning, but fairly advanced. His handwriting is remarkably good.

Case IV.

I. L., female, æt. 11 (No. 7 in the family series). Born at the same place as the preceding. Weaned at 11 months. Was a particularly bright and lively child. Onset of symptoms as before. No infantile diseases nor scalp eruption. Height 3 ft. 2¾ in., weight 46 lbs. 2 ozs., head girth 19¾ in., chest 25 in., abdomen 25 in. The physical signs of this child may be described as being less advanced than Cases I. and II., but more so than Case III. The hair is softer and finer than in I. and II., but the lips thicker, more pouting and everted. The bowels are not so liable to be disturbed. In the supra-clavicular regions, there is fulness, rather than distinct swellings. There is here a slight degree of knee-jerk, which was not evident in the preceding cases. The

skin is less dry and harsh than in any of the other cases described, which the mother ascribes to lubrication with olive oil. Is more lively in her movements than her elder sisters, but can only read the smallest words, though her writing is fair. Temperature 98°.

Case V.

A. A., female, æt. 6½ (No. 9 in the family series), was a small but active healthy infant; weaned at 11 months. The cretinoid changes in this case commenced before she was three years old, rather earlier, therefore, than in the others, but thereafter pursued a similar course. There were no infantile diseases, but between two and three years of age she had a moist and particularly offensive eruption on the scalp. Height 2 ft. 8½ in., weight 28 lbs., head girth 19 in., chest 19½ in., abdomen 20½ in.

This is the only red-haired member of this family which is affected; in other respects the child is a repetition, on a smaller scale, of Case II. The skin of the hands especially is of the same parchment-like character; the general surface of the body, however, being more soft and pliable, which is as in the preceding case attributed to oil inunction. The face is much freckled, but pale and anæmic. There is a very soft systolic bruit. She is of the same quiet, placid and torpid disposition; but can neither read or write, and is generally at a very low level of intelligence. Temperature 97°.

As illustrating the remarkable and almost complete arrest of growth in the above family series so far as height is concerned, the following table enables a comparison to be made between the measurements taken (by the father) four and five years ago and those taken by myself at the date of my examination:—

	Height. January 1884.	Height. January 1889.
Case I.	3 ft. 3½ in.	3 ft. 4 in.
,, II.	3 ft. 1½ in.	3 ft. 1½ in.
,, III.	3 ft. 8 in.	3 ft. 8 in.
,, IV.	3 ft. 1¾ in.	3 ft. 2¾ in.
,, V.	2 ft. 8½ in.	2 ft. 8½ in.

Case VI.

E. N., female, æt. 12½. The father is a healthy man of moderately robust appearance, 50 years old. He has recently been in the Adelaide Hospital, suffering from pleurisy and inflammation of the lungs, but had no previous illness, save that for a long time he has suffered from some affection of the sight. There is no history of any habitual or occasional intemperance, nor of syphilis. He has one sister living, who has two well-grown daughters. The mother of the present patient is 35 years of age, and is a healthy-looking intelligent woman. She was born in London, but has been in the Colony for twenty years, living in Adelaide during the whole of that time. There is no history of syphilis or of any serious illness, and all she knows about her own parents is, that her father died of a fit, which was the only one he had. She has four brothers and one sister living, all married and well, having families, of whom none are dwarfed. She herself was married when a little over 17, and has had ten children, born at the full time; she had

a miscarriage about six years ago, when about four months pregnant. No instruments have been used, nor did she receive any shock during pregnancy. No relationship exists between the parents. The following table shows the order of the family :—

1. M.—Stillborn.
2. F.— Stillborn.
3. M.—Died at 12 months of measles.
4. F.— Died at 10 months of some chest complaint.
5. F. — Now 14 years old ; well grown.
6. F.— Now 13 years old ; well grown.
7. F.— The patient, aged 12 years one month.
8. F.— Now between 5 and 6 ; a well-grown girl.
9. F.— Now 4, and taller than the patient.
10. M.—Healthy infant, but died at 7 months of bronchitis.

The supposed miscarriage was between Nos. 8 and 9. The children that are now living are healthy and well.

After the sixth child was born, the parents went to England with their family for the best part of a year, returning to Adelaide, where the patient was born within six months of landing. At birth the child was fully as large as her other children, and nothing wrong with it was noticed. She began to walk at 12 months, and grew like other children till she was three years old, when she stopped, and has not grown since. She did not learn to talk till nearly 3, but could understand what was said, and used to make dumb show if she wanted anything. The child had some scalp eruption when 9 months old, but no other affection except whooping cough. She has cut (quite recently) the four central permanent incisors, but with these exceptions the milk set persists, some being partially decayed.

Present Condition.—Height 3 ft. $1\frac{1}{16}$ in., weight 37 pounds, head-girth $19\frac{3}{4}$ in., of normal shape. Both anterior and posterior fontanelles partially open. To describe the physical signs of this case would be to repeat, in almost every particular, those of the preceding family series. The resemblance of the features to those of a myxœdematous patient is perhaps greater in this case than in any of the others; the pale anæmic puffy face being suggestive of semi-translucency, and relieved by a rosy blush patch on each cheek. There is the same expressionless and immobile countenance. Dry, harsh skin, tendency to double chin, supra-clavicular swellings, enlargement of veins over upper part of chest, and puffiness over lower cervical and upper dorsal vertebræ. Similar broad clumsy cold hands with loose baggy skin, large firm calves, lordosis, and tumid belly. The appetite however is good, and there is no particular liability to disturbance of the bowels; nor is micturition unduly frequent, as in the previous cases. Temperature 97°. Mentally, she is like a dull child of four or five. She can read very small words, but cannot write. That she is improving in intelligence, her mother is quite certain. The special senses seem of normal acuteness, and the ophthalmoscope reveals nothing abnormal. The knee-jerk and other reflexes are well marked, and she is sensitive to tickling of the soles. In disposition she is placid but cheerful, and she talks a good deal when playing with other children. She realises she is not like them, but is not at all sensitive about the fact. There is a similar tendency, but not nearly so strong as in the previous cases, to bask in the sun, or before the fire.


Case I.


Case II


Case III.


Case IV.


Case V.


Case VI.

CASES OF SPORADIC CRETINISM

(Dr. E. C. Stirling's Paper.)

Photographs of the six patients are submitted herewith. But it is only fair to the photographer, who obligingly took a great deal of pains in the matter, to say that his work, in the first five cases, was performed under circumstances which were extremely unfavourable to a successful and artistic result.

These six cases constitute a series of remarkable uniformity of a condition of arrested bodily and mental development, to which the name of sporadic cretinism was provisionally given by the late Dr. Hilton Fagge in 1871. In an able paper in the fifty-fourth volume of the "Medico-Chirurgical Transactions," Dr. Fagge discusses the subject by the light of seven cases which were all that were then known to him, and advances a theory as to the causation, which, however, the post-mortem revelations in a subsequent case obliged him partly to modify. The paper is further distinguished by a remarkable forecast of the condition we now know as myxœdema, with which the names of Sir William Gull and Dr. Ord are honourably associated. Since Dr. Fagge's article, I can find in the somewhat scanty medical literature to which I have access, a record of only seven other cases, of which three were supplied by himself. These fourteen cases are all from English sources, but I see no reference in any of the published accounts to any occurring elsewhere, so that I may believe that these reports nearly, at any rate, exhaust the literature of the subject. The six cases reported above thus form a substantial addition to the number, and, from the uniformity of the series, should not be without value for future reference.

The fourteen cases previously reported are from the following sources :—Mr. Curling, in the "Transactions of the Medico-Chirurgical Society," vol. xxxiii, two cases ; Dr. Langdon Down, "Transactions of the Pathological Society," vol. xx, one case ; Dr. Hilton Fagge, "Trans. Med. Chir. Soc.," vol. liv, four cases ; and three more in the "Trans. Path. Soc., vol. xxv, where there is also a case reported by Mr. Fletcher Beach ; Dr. Routh, "Proceedings of the Medical Society," vol. vii, one case ; Dr. Sidney Phillips, "Clinical Society's Transactions," vol. xviii, one case ; Dr. H. H. Robinson, "Clin. Soc. Trans.," vol. xx, one case.

On reference to the above cases and those now brought forward, it will be seen that, in spite of some differences, there is such a close generic resemblance between them, as to make it evident that all were of the same nature.

The general characters of the affection need not be repeated here, as they have been well summed up by Dr. Fagge in the paper before referred to, and again appear in the detailed account of the first case of the present series.

The interest of the affection lies of course in its causation, for which we are yet without a satisfactory theory, as well as in the exact nature of the changes in the organs and tissues, on which point the evidence is extremely scanty. Indeed, so far, the only substantial and constant pathological fact, is the proof of the fatty nature of the supra-clavicular tumours, which it will be seen existed at some time or other in every one of the recorded cases. The interest of the whole subject is further increased by the evident similarity of many of the symptoms to those of myxœdema, a point which has been noted by previous writers, and which is so well-marked in the present series.

The question of the relationship of the thyroid to myxœdematous changes cannot be entered into here, but the proved absence of this organ in the two first cases of sporadic cretinism examined, and its putative absence in several others of the living cases, could not fail to suggest the theory enunciated by Dr. Fagge, that the absence of the thyroid was the prime cause of this affection. However, the proved presence of a thyroid of considerable size in a subsequent case, caused Dr. Fagge himself to recognise that other causes must be looked for. In the light of subsequent events, it is of course to be regretted that no microscopic examination of the thyroid in this case was made.

The theory of Dr. Langdon Down, that the mental and bodily stunting results from the intoxication of one or both parents at the time of procreation, finds no support in any of my cases, or in any others except his own, that I can see.

There were no instrumental deliveries in any of my cases, a theory which was at one time urged, in reference to the endemic form of cretinism, and suggested as a possible cause of the sporadic form; nor do they lend any additional support to the idea, that fright during pregnancy might have something to do with the origin of the affection, though, as pointed out by Dr. Sidney Phillips, this has actually occurred in three instances. Nothing apparently can be attributed to consanguinity, or to any kind of local influence.

The principal features of the first five of the series which I present, are undoubtedly the comparatively large number of the same family who were affected, and in all the remarkable uniformity of the age at which the cretinoid symptoms commenced, viz., at about three years of age. Having in the first place learned these two facts, I was in great hopes that such favourable circumstances would permit a careful investigation to throw some additional light on the question of the origin; but in this I have not been successful, as I can detect nothing which in any way distinguishes the birth, early growth, or rearing of the affected, from the healthy members. This uniformity of the time of onset does not exist in the English cases. Taking the cases in which the period is definitely stated, I find that in one the symptoms were congenital, in four they supervened at 1, $2\frac{1}{2}$, 7 and 8 years respectively; in another, the child was noticed to become less active at 9 months, and to cease growing at $2\frac{1}{2}$ to 3 years. In three of Dr. Fagge's cases there was evidently some bodily change, which was probably the beginning of the affection in question at 6, 5 and 8 months respectively. In Dr. Robinson's case, the child is reported as being weakly from birth, and not walking until 12 years of age, or speaking until 13. Still, in spite of these variations, the age of about three years stands out as being the most favoured epoch for the onset.

There is another point to which the South Australian cases suggest a reference, viz., the numerical size of the families in which sporadic cretinism has occurred. The two families in which my cases were found were large, being eleven and ten in number respectively. In two other instances, the families consisted of seven members; and in each of two more, they were five in number. Of the sex, six only of the twenty cases now recorded have been males, and fourteen females, showing, as far as the figures go, an increased liability to the affection on the part of female children.

With regard to the possible existence and influence of any hereditary disease, the only noteworthy features are the existence of epilepsy in two of the affected families, and a severe taint of phthisis in another.

No bone deformity, nor evidence of a past or present rachitic state, existed in any of my cases, though this has been observed by others; nor does there appear to be the slightest evidence to connect the affection with syphilis.

The fontanelles which are reported to have been open in three previous cases, were open in one only of mine (No. 6), and in no case did I observe any abnormality in the shape of the skull, such as has been occasionally, but rarely, noticed. The measurements which are given in my own series, show a fair sized head in each case.

There is one symptom which was a conspicuous element in all my cases, which I do not find specially mentioned in any of the others. I allude to the marked tumefaction, with tendency to hairiness, over the region of the lower cervical and upper dorsal vertebræ. It may be, however, that Mr. Curling's statement, that the "dorsal surface of the body . . . . was hairy," is an indication that this symptom may have existed in one of his cases. Reading this symptom by the light of the general tumefaction in other parts, and the proved existence of fat in the supra-clavicular regions, we may surmise that these dorsal swellings are also fat. If that be the case, it brings forward the abnormal development of fat as a marked feature of the affection.

From the preceding remarks, it will be seen that I am unable to suggest any theory as to the ætiology of this singular affection, and I present this report as a contribution to its study, as well as with a view of eliciting further information from those who may have had the opportunity of observing similar cases. That sporadic cretinism and myxœdema will be found to be closely related, I have little doubt, but it seems clear that the symptoms of the former affection at least cannot be attributed solely to congenital absence of the thyroid gland. Whether they may still be due to retrogressive or atrophic changes in that organ, and what the exact nature of the tissue changes are which give rise to the peculiar features, are questions which have yet to be settled. Viewed in the light of recent experimental evidence, it is difficult to resist the belief, that some impairment of the functions of the thyroid will ultimately be proved beyond all doubt to lie at the bottom of sporadic cretinism, as well as of myxœdema; but at present, for sporadic cretinism, the verdict must be—not proven.

RACE AND INSANITY IN NEW SOUTH WALES, 1878-1887.

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Having seen an article in a recent number (April 1888) of the *American Journal of Insanity* on the subject of "Race and Insanity"—an interesting one to us in an English-speaking country in many respects similar to the United States of America — I have collated the facts to follow from the Registers at Gladesville, an institution which receives all classes and nationalities of the insane as

they occur in the colony of New South Wales. The ten years—1878 to 1887 inclusive—have been taken as fairly representative of a much longer period, and allowing of a reasonable average, considering that at no time in the comparatively recent history of the colony has there been any special immigration of any of the races tabulated.

At the outset I am confronted with a difficulty, in that the Australasians, that is those born in Australasia of whatever parentage, are of no special race. For instance, a Scandinavian marries an Irish woman, both having emigrated south; a Scotchman takes to wife one born in Australasia; a male Australasian mates with a native of the British Isles or of the Continent—to what race, strictly speaking, can the progeny be said to belong? Unless then we are prepared to call all those born in Australasia representatives of a race, we are hampered by the fact that, for the period mentioned, less than half of the whole number specified cannot be considered. But making them into a race or nationality, in respect of their birth in the southern hemisphere, instead of the northern, with the difference in climatic conditions, habits, customs, &c., considered (and these may have coloured to some extent the influence of heredity in one or both of their parents, as the case may be), we have something definite to go upon, and comparison can be made with specific races and nationalities.

A constantly recurring source of variation in making any statement in connection with the "Australasian Nationality," is found in its marked hybridity. It will be admitted that the progeny of the native born, of whatever parentage themselves, can hardly be fairly associated with the progeny of parents of different race; the only thing Australasian about the progeny of the latter being, that they first saw the light in Australasia; still, for the purposes of this paper, and after the explanation given, this much must be allowed.

The nationalities in Table I are sufficiently well-known; but it may be as well to mention that in the Australasian group, Tasmania and New Zealand have been included; the United States of America and Canada have been classed together; the Channel Islands have been thrown in with France, Austria with Germany, Russians with Scandinavians, and the Ionian Isles with Greece.

As to the classification of insanity adopted, some explanation is necessary. For example, under states of mental exaltation, or what is generally classed simply as mania, have been placed acute, sub-acute, senile, puerperal and recurrent mania. Under the next great type—states of mental depression or melancholia—simple melancholia, acute, and puerperal. Under states of mental enfeeblement (not want of development) all forms of dementia, including primary, secondary, organic, &c., but excepting that caused by intemperance, which comes under a separate heading. Under general insanity, with which is included chronic mania, are classed all those who are simply insane hopelessly, and who are incoherent always, have no idea of their surroundings, &c. Under the heading of paranoia, or states of delusional insanity, come both delusional mania and delusional melancholia, which is to some extent unfortunate as regards the object of this paper. It would have been better had the cases of exaltation and depression been placed under the separate headings prepared for them, especially as the cases of delusional melancholia are

much in excess of those of delusional mania, but I was obliged to take the figures as they appeared in the registers. The rest of the headings, with one exception, are self-explanatory. The cases of intemperance in drink have been placed together, whatever their mental condition, and this has led to some interesting facts, to be mentioned later. The figures include, of course, both males and females, without special mention as to their social condition.

The numbers in the races or nationalities numbered from 11 to 21 inclusive in Table I, are, apart from other considerations, so few, that little need be said about them. In passing, it may however be remarked, that the West Indians were all of negro extraction, if not pure-blooded Africans; their tendency being towards delusional insanity. The natives of the Indian Peninsula were of the Coolie class, and insanity with them seems to be comprehensive in its subdivisions. But those numbered 1 to 10 inclusive (*vide* Table I), may command a good deal of notice.

By comparing the actual number admitted to Gladesville Hospital in the ten years (the grand total of all nationalities being 2858, out of an average population resident in New South Wales of 847,725, *vide* Table II), it will be noticed that, although this hospital is the oldest in the English-speaking southern hemisphere, and that it is situated in the oldest settled part of Australasia, there were admitted but 99 more Australasians than English, and 141 more than Irish in the decade.

It has just been stated, that very few more Australasians than English or Irish were admitted during the decade, and this anomaly may to some extent be explained, when we remember that the majority of those (omitting idiots and imbeciles) sent to this hospital were adults, and that presumably almost all the English and Irish were so, whereas the general population of the colony consisted of Australasian children in addition to the adults. Again, it is well known that many "ne'er-do-weels," either from vice or mental infirmity, and some who have been insane in the old country, but who have recovered to a certain extent, are sent here to be out of sight of their friends. But apart from this, we still have the startling fact, that the number of English and Irish insane in this colony (especially the Irish) are vastly in excess of their proper proportion. The subjoined figures (Table III) will show the proportion of the insane in Gladesville to the population of New South Wales in respect of nationality:—

1.	1 Frenchman	in every	76	was insane.
2.	1 German	,,	85	,,
3.	1 Scandinavian	,,	89	,,
4.	1 Irishman	,,	93	,,
5.	1 American	,,	96	,,
6.	1 Welshman	,,	127	,,
7.	1 Englishman	,,	135	,,
8.	1 Scotsman	,,	155	,,
9.	1 Chinese	,,	188	,,
10.	1 Australasian	,,	579	,,

It will be seen that the French head the list. This may be due to the proximity of New Caledonia, many of the patients being escapees from there; and it is interesting in this connection to speculate, whether

in the first instance they were not fitter subjects for asylum treatment, than for penal discipline. A glance at Table I will show that the majority of the cases of the French nationality were of delusional insanity—a common form in foreigners, and caused no doubt by their want of appreciation of the English language, the customs and habits of the new country, &c., these tending to make them suspicious, and inclining them to false beliefs. Following the French, are their near neighbours the Germans, showing a large number of insane for their population, the tendency with them also being towards delusional insanity, and probably for the same reasons. Indeed, this seems to be true of all foreign nationalities, but less so of the Chinese than any other. To return to the numbers of the insane compared to the population, it is found that third on the list are the Scandinavians, fourth the Irish, fifth the Americans of the United States, sixth the Welsh, seventh the English, eighth the Scotch, ninth the Chinese, and last the Australasians. The above figures point strongly to the fact, that the peoples of the Continent of Europe, whatever may be their tendency to become insane when at home, seem to have a marked tendency to mental alienation here. Running them close however are the Irish people, whose number of insane is altogether disproportionate to any other of the English-speaking people, excepting the Americans, and they are so few as to hardly bear comparison. The reasons for the excess of insanity in the Irish nationality have been very variously stated, and need not occupy much time now. I am of opinion that a powerful factor in their becoming subjects for asylum treatment when insane is, that they seem to have more loss or abeyance of will-power and to be more demonstrative then than any other nation, and that for these reasons they find their way earlier to asylums, whereas persons of other nationalities recover at home. But if race or nationality was all-important in the causation of, or tendency to, insanity, the Welsh who, like the Irish, are of Celtic extraction, should hold as high a place numerically ; but it is found that the Irish number 1 in 93, the Welsh only 1 in 127. The percentage of the English is slightly larger than the Welsh, that of the Scotch considerably less than the English. The Chinese insane, according to statistics, are few, but this must be accepted with reserve, as many of the Chinese insane are harboured by their countrymen, and instead of being sent to asylums, are shipped off to their own country. On the other hand, it would seem that their being foreigners has not the same weight in the causation of mental alienation as obtains in European foreigners.

Having taken the various nationalities *seriatim*, the Australasian is reached, and a glance at the figures in Table III will show how very few became insane compared with any other nationality ; the nearest approach to them, but still very distant, being the Chinese. It has been stated previously, that as regards the British Isles, the discrepancy is explained away to a very slight extent by the fact, that adults fill asylums, and that the number of Australasians in the Colony is to a considerable extent made up of children. But this is not nearly sufficient to account for the great disparity. What then are the reasons for the extraordinary immunity the Australasian nationality seems to have? Is it because of their marked hybridity? Has the climate anything to do with it? Are the habits and conditions of life of the native white people conducive to mental stability? Is the standard

of civilisation a reason for it, or are the morals of the Australasians in their favour? Is their self-reliance and self-confidence a reason?

That the hybridity is a large factor against insanity I have little doubt, in that the chances of perpetuation by heredity are lessened where people of distinct nationalities inter-marry, the breed as it were being changed. For example, it is more probable according to the facts elicited, that the children of French, German or Irish parents may become insane, than that the children of—say a Scotch father and Irish mother should; the cross-breeding here causing a dilution, if I may use the word, of any tendency to insanity which may have existed.

That climate may be in their favour seems to me to be demonstrable, seeing that generally speaking everything which conduces to physical, conduces also to mental health; and the Australasian climate certainly lends itself to the acquiring and keeping up of health, by the amount of open air life which it permits.

It may be worth a passing thought, that (statistically) warm countries or climates do not furnish a large percentage of insane from among their inhabitants. At any rate, the number of Chinese and Australasians compared to those further distant from the equator would seem to point to this. Can it be that the almost perpetual sunshine over the greater part of Australasia militates against insanity?

That the conditions of life, or rather of living, are easier here than in most other countries, is undeniable. This can, I think, be admitted as a reasonable factor in the maintaining of mental health. Food, and even luxuries, are abundant; the cares and worries of life are not so constant or harassing; not so much thought is taken for the morrow, because it seems to be unnecessary. The habits of the Australasians are mostly begotten by the climate; life is taken as it comes, what matter if troubles loom! The worst is in the anticipation, the realisation proves itself to be nothing very dreadful after all, and this they seem to appreciate.

That they have reached a standard of civilisation which may be in their favour, is open to doubt. It is just possible, however, that their habits and conditions of life permit of no other, and in this way it may be in their favour. As to their morals, comparison indicates nothing either way.

The last, but perhaps most important, reason for the preservation of their mental equilibrium, is the possession of much self-reliance and self-confidence. Precocity may be a questionable virtue, especially as it is often allied to genius, which again is so often associated with mental disease; but what people assert themselves so freely? (often, no doubt, on mistaken or insufficient premises); and as regards the individual, who at the age of fifteen is so much a man in thought, word, and deed? who cuts the apron-strings which remain intact so much longer in older countries? and what nationality has made such material progress, according to the resources available, as the Australasian? I do not urge that these qualities are eminently in their favour in the eyes of other nationalities, but I submit that their self-reliance and self-confidence remain potent factors in the prevention of mental alienation. It may be said that the same reasoning would apply with equal force to the Americans of the United States and to the Canadians, in whose case the proportion of insanity

is large; but I imagine that the very high pressure which obtains with them is a sufficient reason to annul, or at any rate modify largely, the advantage gained by their self-confidence. Besides, they are notably a nervous people—this, in itself, being a predisposition or ally, no matter how slight, to mental disturbance.

It remains to me, for the completion of my subject, to indicate more particularly the kinds of insanity from which the various nationalities in this Colony at any rate are prone to suffer, and finally, to draw conclusions if possible therefrom.

The nationalities in Table I, numbered 11 to 21 inclusive, have as far as their importance goes been already dealt with, and will not be again referred to. Those numbered 1 to 10 inclusive, I shall take in the order given in the table. It may be as well to mention here, that the mental states known as idiocy and imbecility, and that of epileptic insanity will not be considered separately, inasmuch as the number of those so afflicted appertain almost solely to Australasia for obvious reasons, and cannot therefore invite any comparison with other countries. But statistically, they have been included among the Australasian insane—another proof of the small tendency of that nationality to insanity.

A reference to Table I will show that, with the exception of the Welsh, the Australasians seem to have the greatest tendency to states of mental exaltation or excitement, the Americans of the United States (always remembering that the number compared is few) least. I have no explanation to offer for these facts, but would like to say that of all forms of insanity, the cases of mania are sent earliest to asylums, mainly on account of the demonstrativeness common in such cases, and this may account for the large number of maniacal cases found under most of the nationalities in Table I.

Of melancholiacs, it is found that the Americans head the list with a percentage of 20, the Welsh having the least tendency to states of mental depression. It has just been seen, however, that the Welsh are eminently given to exaltation of mind—a confirmation, if any were needed, that it is unlikely they would also be subject to melancholia. Following the Americans are the Chinese, with a percentage of 16. The English, Irish, Scotch, German and Australasian nationalities seem to have about an equal tendency to mental depression. In this country many of the cases of melancholia are found in shepherds, and in people who live a more or less solitary life in the bush. A considerable number of the Chinese admitted were shepherds, and in their case, no doubt, the depression was often set up or aggravated by the use of opium.

The next great type of insanity—the one according to Dr. Clouston to which most others tend, the bane of asylums, the unwished-for goal—is dementia, or enfeeblement of mind. The Welsh show the large percentage of 50, but the numbers are too small to allow of any accurate inference. The Chinese show 33 per cent., and next come the English with a percentage of 21, then the French and Scotch. That the Welsh should be 50 per cent. points to the incurability of their insanity, in that, if it is not originally dementia, it finally reaches this goal.

General paralysis of the insane next comes up for consideration, and it is at once seen, that from this most fatal form of insanity the Australasians seem to have marked immunity, more so than any other nation, the Americans having the highest proportion. The Inspector-

General of the Insane for New South Wales assures me that twenty years ago general paralysis was almost unknown, or at any rate a great rarity, in the asylums of the United States of America, but that now it is rife. I find that the percentage of general paralysis in Australasians is 1 per cent., English 5 per cent., and Americans 12 per cent. The Durham miner who, when earning good wages, drinks hard, works hard, lives on much flesh meat and is given to excess generally, is said to fulfil all the conditions necessary to the setting up of general paralysis. It is said also to be commonest in races of high civilisation. This latter points hardly at the Australasians, but is doubtfully complimentary to the other nationalities concerned. We have yet to learn the reason of its selection.

In paranoia, or delusional insanity, Great Britain, Ireland, and foreign countries stand pre-eminent compared to the Australasians, the Scandinavians showing the highest proportion. In foreigners, whose knowledge of the English language is limited, this is to some extent explainable; but the Irish do not lag far behind.

The remaining forms of insanity are unimportant to our subject, excepting those tabulated as having been caused by drink. As before stated, the mental condition, no matter in what form, if caused by intemperance, was placed under this heading. A glance at Table I will show that from intemperance there were no Chinese admitted; surely a plea in their favour as colonists. The Americans seem to have been most guilty, the Scotch next, the Australasians (excepting of course the Chinese) least; and between these come the English, Irish, Germans, and Scandinavians, of about equal demerit. It appears, then, that by comparison with old-world European nationalities, the Australasian is a temperate one. This is, I think, held true, apart from proof derived from statistics of insanity. I would, however, before closing the subject of insanity, as supposed to be caused by intemperance in drink, like to add, that it is an uncertain cause in statistics, inasmuch as many cases are put down as being caused by drink, whereas the converse was true—the insanity caused the drinking habit. This of course applies to all nationalities equally.

What then can be deduced from what has been said?

(1) It seems undoubted that so far, or as at present constituted, the Australasian nationality is peculiarly free from mental disease. (*Vide* Table III.)

(2) That in the decade (1878–1887) less than half of those admitted were Australasians.

(3) That the English and Irish insane (especially the latter) are, by comparison with the Australasians, vastly out of proportion.

(4) That the Continent of Europe supplies an undue number of insane to the colony.

(5) That Chinese have a much smaller number of insane than any other nationality, excepting the Australasian.

(6) That foreigners (not including the Chinese) have a tendency towards delusional insanity.

(7) That Australasians seem most inclined to states of mental exaltation, and least to general paralysis of the insane, which is indeed conspicuous by its infrequency.

In Table I, under each nationality, will be found the absolute number and the number per cent., suffering from each form of insanity.

Table I.

Form of Insanity.	Australasian (including New Zealand).	English.	Irish.	Scotch.	Germany and Austria.	Chinese.	Scandinavian and Russian.	U.S. of America (including Canada).	Welsh.	French and Channel Islands.	Indian Peninsula (Coolie).	Swiss.	Aborigines.	West Indian.	Italian.	Greece and Ionian Isles.	Spanish.	Dutch.	East Indian.	South Sea Islanders.	African.
States of Mental Exaltation, including— (a) Mania, Acute (b) ,, Sub-acute (c) ,, Senile (d) ,, Puerperal (e) ,, Recurrent	180	135	103	21	11	7	2	1	6	2	1	1	..	..	1	..	..	..	..	1	1
	20·45	17·13	14·00	13·125	11·96	12 96	6·06	4·00	25·00	11·11	..	..	..	..	..	..	..	..	..	..	..
States of Mental Depression, including— (a) Simple Melancholia (b) Acute ,, (c) Puerperal ,,	114	97	99	22	12	9	4	5	2	2	1	3	..	..	1	..	..	..	..	1	..
	12·95	12·31	13·45	13·75	13·05	16·66	12·12	20·00	8·33	11·11	..	..	..	..	..	..	..	..	..	..	..
States of Mental Enfeeblement, including— (a) Primary Dementia (b) Secondary ,, (c) Organic ,, (d) Paralytic ,,	146	172	121	32	14	18	3	2	2	4	1	..	5	..	..	1	1	2	..	..	..
	16·59	21·84	16·44	20·00	15·22	33·33	9·09	8·00	50·00	22·22	..	..	..	..	..	..	..	..	..	..	..
Epileptic Insanity	31	10	8	2	..	..	1	1	..	..	1	..	1	..	..	..	..	..	..	..	..
	3·52	1·26	1·08	1·25		..	3 03	4·00	..	..	..	..	..	..	..	..	..	..	..	..	..
General Paralysis	13	43	18	9	8	..	3	3	..	..	1	..	..	..	..	..	..	..	.	..	..
	1·47	5·45	2·44	5·62	8·7	..	9·09	12·00	..	..	..	..	..	..	..	..	..	..	..	..	..
Paranoia, or Delusional Insanity	165	213	278	49	36	15	15	9	3	7	4	4	..	4	1	2	1	..	..	..	..
	18 75	27·63	37·77	30·62	39·13	27·77	45·46	36·00	12 5	38·88	..	..	..	..	..	..	..	..	..	..	..
General Insanity, including Chronic Mania	78	59	60	11	7	5	4	..	1	3	1	1	..	1	2	..	..	..	1	..	..
	8·86	7·49	8·15	6·875	7·6	9·26	12·12	..	4·16	16·66	..	..	..	..	..	..	..	..	..	..	..
Mania Melancholia e potu Dementia	32	45	38	13	3	..	1	3	..	..	..	..	..	1	..	..	..	..	..	..	..
	3·63	5·71	5·16	8·12	3·26	..	3·03	12·00	..	..	..	..	..	..	..	..	..	..	..	..	..
Hysterical Insanity	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	·34					..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Imbecility	104	13	11	1	1	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..
	11·81	1·65	1·50	·625	1·08	..	..	4·00	..	..	..	..	..	..	..	..	..	..	..	..	..
Idiocy	14	1	.	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1·6	·13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total of each Nationality	880	788	736	160	92	54	33	25	24	18	10	9	6	6	5	3	2	2	2	2	1

TABLE II.

Showing average numbers of respective nationalities resident in N.S.W. during 1878–1887.

	Nationalities.	Population.
1	Australasian	509,788
2	English	106,200
3	Irish	69,044
4	Scotch	24,828
5	Chinese	10,179
6	Germans, &c.	7,809
7	Welsh	3,067
8	Scandinavians, &c. ..	2,958
9	U.S. America, &c. ..	2,407
10	French, &c.	1,369
11	All other Nations ..	110,076
		Total 847,725

TABLE III.

Showing proportion of insane of each nationality in Gladesville to persons of that nationality resident in N.S.W. during 1878–1887.

	Nationalities.	Insanity According to Population.
1	French	1 in every 76
2	Germans, &c.	1 ,, ,, 85
3	Scandinavians, &c. ..	1 ,, ,, 89
4	Irish	1 ,, ,, 93
5	U.S. America, &c. ..	1 ,, ,, 96
6	Welsh	1 ,, ,, 127
7	English	1 ,, ,, 135
8	Scotch	1 ,, ,, 155
9	Chinese	1 ,, ,, 188
10	Australasian	1 ,, ,, 579

INSANITY IN AUSTRALIAN ABORIGINES, WITH A BRIEF ANALYSIS OF THIRTY-TWO CASES.

By F. Norton Manning, M.D.

Inspector-General of the Insane in New South Wales, and Lecturer on Psychological Medicine in the University of Sydney.

So far as can be gathered from the accounts published by explorers and early colonists, insanity was a very rare affection among the Australian aborigines whilst in their primitive and uncivilised condition.* From such accounts as are accessible, it appears that when insanity did occur, if the subject of it was violent and aggressive,

* "The Australian Race," by Edward M. Curr, p. 208.

he was promptly slaughtered ;* if melancholic, he was allowed—if so disposed—to commit suicide ; if demented and helpless, he was left to die ; and only when quiet and peaceable, and when his erroneous ideas did not result in offensive acts, was he allowed to continue in the tribe, and in some cases was held in reverence as a superior and inspired being. The Australian aborigines, in fact, acted towards their insane in much the same manner as almost all savage races appear to have done, and carried out to its fullest extent, in this respect, the great principle of the survival of the fittest — practically working in the direction of stamping out the malady. In addition to this, their simple and uneventful existence, without worry or strain, and their marriage laws (which forbade all consanguineous, or even intertribal or interseptal marriages) served to prevent the occurrence of what may be called occasional, and of hereditary insanity.

As time rolled on, and the aborigines were brought more in contact with Europeans, and became acquainted with the vices and the cares of civilisation, we find more frequent notices of mental disease. The Rev. George Taphill writing on "The Natives of New South Wales," says :—"I have frequently seen cases of epilepsy" (p. 259). "I have seen several cases of lunacy among them, and it is not uncommon for the intellect of old men to give way, and for them to be insane" (p. 260). Mr. Phillip Clancy, in an appendix to Mr. Brough Smyth's learned work on "The Australian Aborigines," says :—"I have never observed insanity or hereditary or chronic complaints among the natives, except in those vitiated by white people" (p. 254) ; and Mr. James Dawson writes :—"Suicide is uncommon and cases of insanity rarely met with, but the aborigines believe there is more of it since the use of intoxicating liquors, and especially since they began to disregard their laws of consanguinity in marriage" (pp. 61 and 62). The growing amount of insanity, and the greater tendency to it in so-called civilised aborigines, are illustrated by the statistics of Queensland and New South Wales. In Queensland a large part of the aboriginal population had not, until quite recent years, been brought into contact with more than the confines of civilisation. This population is estimated, as I gather from information obtained from the Registrar-General's Office in Brisbane, at something like 20,000, whilst the number of aborigines admitted to Queensland asylums, since the year 1868, has been fourteen only. The aboriginal population of New South Wales has been for years past a miserable remnant, supported for the most part by the Government, afflicted with the vices and diseases of civilisation, and devoid of the nobler and better characteristics of the race. Since the year 1868, 18 aborigines have been admitted to the asylums of New South Wales from a population which has never during that time exceeded 2500, and is now less than half that number. It is noteworthy too, that during the decennial period 1868–1877, eight aborigines were admitted ; whilst during the next decade 1878–1887, ten were received, showing an increasing number of insane, whilst the aboriginal population was steadily decreasing. In the census year 1881, the proportion of aboriginal insane to the aboriginal population in New South Wales was 2·83 per thousand, a proportion in excess of that for the general

* "Australian Aborigines," by James Dawson, p. 61.

population; and at the close of 1887, it was upwards of 5 per thousand. The rate at this period would have been even higher, if the duration of life in aborigines in confinement were not extremely short, and much below the average of that of Europeans under similar conditions. We have then, in New South Wales, passed from a period in which insanity was almost unknown among the native race, to one in which it is almost twice as common as among the European race inhabiting the same territory. I have received from my friend and colleague Dr. Scholes, brief notes of all the cases (fourteen in number) admitted to Queensland asylums since 1868; and all admitted to asylums in New South Wales, from August 1, 1868, to December 31, 1887, (eighteen in number), came more or less fully under my own observation.

Of the thirty-two cases, twenty-four were males and eight females, and the following short return gives the general results:—

	Males.	Females.	Total.
Admitted	24	8	32
Died	17	3	20
Discharged recovered ...	3	3	6
Remaining	4	2	6

In addition to the above, two half-castes were admitted.

In considering the causation of the malady in these thirty-two cases, it was beyond a doubt that the chief share was due to civilisation and its accompanying vices, and to the changes of life and habits incident to this. A considerable proportion of the cases were due directly to drink; four or five were due to imprisonment, awarded either for offences springing from drink, or for violence which, though within the ethical code of the native, was by civilisation accounted a crime.

It was a remarkable fact that, with one or two exceptions, the whole of the patients spoke English some with great facility and correctness, and with a rich knowledge of expletive and objurgatory expression. Three of the patients had served in the police as troopers or trackers.

As might have been expected in a dark-skinned race, the prevailing type of the malady was mania, usually acute, and as a rule accompanied by turbulence and violence, and this passed very rapidly —much more rapidly than in Europeans—into dementia, with filthy and degraded habits. In some of the cases, the hallucinations of sight and hearing were extremely vivid; and in one of the less civilised cases, the patient, not recognising his own reflection, persistently smashed looking-glasses, or tore them down when in fixed positions, so as to get at the source of the voices which annoyed him.

The melancholic cases all originated in gaol, and were due apparently to more or less prolonged imprisonment for offences such as rape, wife murder, or manslaughter, which the native code regarded as venial. The melancholic as well as the maniacal cases tended at an early stage to dementia, and this was in most cases extreme, and accompanied by failing health and indescribably dirty habits.

Epilepsy occurred in three cases, and the fits were well marked and severe.

No case of general paralysis, or anything which could be mistaken for it was seen, and there were no cases of monomania or delusional insanity.

One of Dr. Scholes' cases was an imbecile, but as the girl was blind from a very early age, it was difficulty to say whether the imbecility was congenital, or was mainly due to deprivation. Another of Dr. Scholes' cases was an excellent example of puerperal mania. It followed immediately on the birth of the patient's second child, and she was admitted a fortnight after parturition, the breasts being full of milk, and all the ordinary symptoms of puerperal mania present. She made a good, but not rapid, recovery.

The cases of recovery—six only in number—were in hospital for comparatively short periods, the longest being eight months. In several cases discharge was postponed, owing to the difficulty of fixing a standard of saneness, and also by reason of the necessity of finding a home for the patient.

In only one case was there relapse and re-admission, and in this, the cause of the original attack and of the relapse was drink.

The deaths numbered twenty, and in several cases the only cause which could be assigned was "marasmus"—a gradual wasting, without tubercular or other manifest ailment. Eight deaths were due to phthisis, either comparatively slow in approach, or in the form of rapid tuberculosis. Two died from epilepsy, three from serous apoplexy, and one from maniacal exhaustion.

The average duration of life in hospital was much shorter than in Europeans. The confinement, though tempered by many unaccustomed comforts, being apparently the great factor in shortening life.

Two of the men were described as the last of their tribes. Several of the women were much cut about the head, in accordance with Aboriginal custom. In one case, the cuts penetrated the outer table of the skull, which now forms an admirable museum specimen, in several places. All the cases now in hospital display considerable dementia, but two are usefully employed.

INEBRIETY—ITS ETIOLOGY AND TREATMENT.

By Patrick Smith, M.D.

What is inebriety? Inebriety may be defined to be an overwhelming morbid desire for the state of intoxication, or narcotism. I say advisedly intoxication, in contra-distinction to intoxicating liquors. This definition at once excludes the great majority of so-called drinkers or drunkards, for some drink out of good-fellowship, others for the exhilarating effects to be obtained, and a few for the pleasurable sensations to the palate. But it is the aim and object of most to stop short of intoxication. If drinking were likely to affect their position, socially or pecuniarily, or to interfere with their health, comfort, or convenience, the habit could be given up with greater or less effort by all. In short, they are not yet under the power of the habit. Now in so far as such do injury to themselves, or are entrapped by intoxication, they must be classified as vicious. This is the vice of inebriety. It is

from the ranks of the vicious drinkers that the inebriates, strictly so called, are drawn. A careless habit or social custom has been followed till it has become a vice, which in time may develope into a disease. I shall confine my attention in this paper, not to the vicious inebriate, but to the diseased.

The inebriate proper is a remarkable contrast to the drunkard. He cannot drink in moderation. For him, no apprenticeship of years, or long familiarity with alcohol is necessary. On slight acquaintance, a fierce ungovernable desire is set up. Two men begin to drink together, say from the same bottle, and after one or two glasses, one is totally unaffected, but in the other a craving has been excited, which only a complete debauch will satisfy. Loss of position, of character, of fortune, and of health may be the result of the gratification of this impulse, but these are utterly disregarded. Dr. Wright, in his work on "Inebrietism," page 43, thus describes and explains this craving:—"The whole mind is filled, at certain times, with the contemplation of an imperative morbid desire. All the resources possible are brought to bear in procuring the gratification of a pervading and domineering appetite. Such a condition of perverted inclination will rest content with nothing short of the complete satisfaction of its demands. Any such satisfaction must reflect properties equally powerful and universal with the element demanding it, and also equally morbid."

The question arises—Why was the one drinker uninfluenced by the same quantity of the same liquor, and why in the other was there such a tempest of desire aroused? Was the one totally depraved, or less under the restraining power of religious, moral, or social influences than the other? The probability is that such was not the case. The conclusion is inevitable, that the difference in effects arose from a fundamental difference in constitution. In the one case, there was no response to the stimulant from without, while in the other the response was totally disproportionate. The one had not what is technically called the neurotic temperament or diathesis, while the other had.

What is the neurotic temperament? In this temperament, when it is a *damnosa hereditas*, there is some fundamental deficiency, lesion, or flaw of the brain, whereby that organ is placed in a state of unstable equilibrium. To borrow a term from mechanics—the governor of the engine is faulty. There is an extreme susceptibility in the nervous system to take on spasmodic action. A stimulus applied from without, which in the healthy would be without effect, creates in the neurotic subject an outburst, or quasi-storm of function, which has been described as beyond his control, and without his consent. The power of inhibition and of will are for the time lost. Handicapped with such a temperament, the neurotic is indeed an object for pity. How is such an one to meet the trials and temptations of life without succumbing to them? Only by the most judicious management and intimate knowledge of his condition.

Maudsley says that this neurotic or spasmodic temperament is fundamental—its outcomes, various. It will be a mere accident, depending on external influences, whether this diathesis will lead its possessor to crime, inebriety, or insanity. However, it is just possible it may remain latent through life. If search be made into the family history of the neurotic, very decided confirmation of the law of heredity

may be discovered. It is found, except in the rarest instances, either that one or both of his parents, or grandparents—not to go further back—had a strain of insanity, or inebriety, or crime in their constitution; or that they suffered from epilepsy, or some wasting disease; or that they were debilitated, from overstrain of mental work, or excesses of some kind; or were themselves neurotic. The neurotic diathesis, though usually inherited, may also be acquired. The high state of nervous tension, which has been induced by our modern civilisation, the hurry, bustle, and excitement in which we live, the temptation to engage in speculation, which involves risk and anxiety; the injury done to the young in the fierce competition of school life, the prevalence of luxurious and drinking habits, and the debilitating influences brought to bear in concentrated form on our own generation, as on no former one, tend to make neurotic parents, in whose offspring the diathesis must appear in a still more marked form. The increase of neurotics at the present time is in the light of these conditions easily comprehended.

Now, all that applies to the general neurotic condition, applies equally to the special neurosis of inebriety—the alcoholic. Some are born with a special susceptibility to the stimulus of alcohol, and an insignificant quantity drunk produce in such the most disproportionate results—the morbid craving before described. It is in this brain deficiency, inherited or acquired by long indulgence in alcoholic liquors, that we have the *fons et origo* of the craving for narcotism. The act of drunkenness is merely the expression of the inward craving, just as the excessive drinking of water is the expression of the existence of a feverish or other diseased condition. The symptoms have attracted the chief attention, while the real disease has been unnoticed.

It is surely then a legitimate deduction, that a craving so fierce, so disproportionate to the exciting cause, is not due to the gratification of the palate, but to a diseased condition. That craving must surely be due to disease, which suddenly seizes on some of the most cultured, refined, and generous men, which in a few hours completely changes their characters, and causes them to associate with men they despise, and makes them resort to cruelty, and selfishness, and meanness, utterly foreign to their nature.

The close analogy existing between insanity and inebriety proves the existence of an alcoholic, as well as of an insane, neurosis. The fundamental principle on which insanity is treated, is that it is a physical disease. As we are warranted in inferring a morbid diathesis in the one case, so are we in the other. So alike in almost every respect are the symptoms of periodic insanity and of dipsomania, that apart fron the history of the case, it would be hard to distinguish between them. In both the attack may come without any known exciting cause; for it is not always necessary to take alcohol to set up an attack. On the contrary, the impulse is from within—central. The attack once begun rapidly advances to an explosive point. If alcohol be obtainable, the impulse cannot be stayed till complete exhaustion of mind and body is reached. When the point of narcotism is reached the craving ceases, and an interval of comparative quiet succeeds, during which the dipsomaniac has no inclination for alcohol, and may even loathe it. Another attack, exactly like the former, at irregular intervals of weeks, or

perhaps months, follows, and it is this periodicity that stamps the attack as a neurosis. The prodromic symptoms in both cases are exactly alike. In both, there may be observed a day or two prior to an attack, some alteration in manner, gait, or speech, a twitching of the muscles of the face or fingers, or a general restlessness and malaise. But a craving, similar in degree and nature, may also be acquired by the habitual drinker. The periodicity of the attack in his case is absent, but craving may be said to be perpetual. In the former it would surely be monstrous to impute vice, whereas in the latter no condemnation can be strong enough.

Injuries to the head, and the consequent disease of some portion of the brain, are a frequent cause of sudden development of inebriety, just as of insanity. After an injury to the head, a considerable interval may elapse before inebriety shows itself, because time is required for the morbid changes set up to extend far enough to produce a condition of unstable equilibrium. Disease origin is doubly proved in such cases, for when the injury is capable of repair by surgical means, the inebriety ceases. Out of 600 inebriates treated at Fort Hamilton (the Inebriate Retreat for the State of New York), Dr. Norman Kerr tells us ("Inebriety," page 165) that 123, or nearly one-fifth, had received blows on the head; one-third of these were fractures of the skull. Out of the 123, seventy-one had become habitual, and fifty-two periodic, inebriates. In the Dalrymple Home at Bickmanswarth, England, out of 103 admissions, six owed their inebriety to injuries of some kind, three being in the region of the head.

When we find outbreaks of inebriety, just as of insanity, following more or less closely, even in previously sober people, on heat apoplexy, on severe nervous shocks from excessive grief, or from railway or other accidents, in the course of wasting diseases, in nervous exhaustion, it seems impossible not to admit a physical disease origin.

With regard to the crucial test of post-mortem appearances, inebriety like insanity being to a large extent functional, and due to congenital or prenatal brain deficiency, morbid changes cannot in the present state of our chemical and mechanical knowledge be demonstrated. When the disease is of long standing, especially if acquired by long continued hard drinking, alterations in the encephalon structures are found, but these are the results, not the causes, of disease. Dr. N. Kerr ("Inebriety," p. 212) says:—"That in his examination of the bodies of those who died during, or immediately after an attack of inebriety, he found appearances of hyperaemia, injection of the mucous membrane of the stomach—in cases so inflamed as to suggest metallic poisoning; in all cases, congestion of the meninges; in several, general congestion of the brain; and extravasations of blood existed both on the interior and exterior of the cerebrum." More extended observation will no doubt add to our knowledge of these morbid appearances, which are after all only what might be expected from the symptoms.

Assuming then, that inebriety is a physical disease, I proceed to inquire what we can reasonably expect to accomplish by treatment. Up to within a very recent period, inebriety has been regarded by the profession and the public as arising from utter moral depravity, and as such to be dealt with by clergymen, social reformers, and temperance lecturers. But thanks to our professional brethren in America, who

have nobly pioneered this field of study, it is widely recognised as a physical disease and amenable to treatment. As a profession, we regarded the inebriate with despair, but now we are more hopeful. Moral and religious influences and persuasion have induced multitudes to reform, and have saved them from becoming dipsomaniacs; but the diseased inebriate and the dipsomaniac has been proof against all attempts to reform. But, what is possible to be done by treatment? We cannot eradicate the diathesis, and give the inebriate a new constitution; but we can recognise the symptoms of a coming attack, and prepare for it. The prodromata, the restlessness, depression, timidity, the muscular twitching and other storm signals already mentioned, can be corrected and rendered practically harmless. Especially can we attend to organs which may be in a morbid condition by medicinal and hygienic appliances. We can promote the repair of diseased tissue, and with healthy organs may expect to remove morbid craving. Two conditions, and only two, are essential to the attainment of cure as far as that may be possible, viz., the withdrawal of alcohol from the inebriate, and securing sufficient time for the repair of damage done to organs and tissues.

Easy as these two conditions seem, they are even now most difficult of attainment. Home treatment of the inebriate on many accounts so desirable, is rendered all but hopeless, on account of the difficulty of preventing the patient from obtaining liquor; let those testify, who have ever made the attempt. Is it any wonder that failure has been the result? Even Inebriate Asylums in America and elsewhere, have largely failed on account of not being able to overcome this difficulty. Prior to the establishment of retreats, it was only in gaols and lunatic asylums that alcohol could be effectively prohibited; but they failed, and still fail to cure, because sufficient time for the repair of diseased tissue cannot be obtained; not even the most worthless police-court "repeater," let alone a wage-earning citizen, would be sent to gaol for a year for drunkenness; nor even the worst dipsomaniac is it now possible to keep for a like period in a lunatic asylum. For as soon as the attack is over, the detained can plead so well his possession of all his faculties, his loss of time, his surroundings, that speedy release generally follows; thus sufficient time is not allowed. The shortest time of treatment which would give even the hope of permanent cure, is allowed to be a year. Dr. W. B. Richardson gives it as his estimate, that two years are required for many, and that three, four, or even five years for numbers. What can moral and religious influences do against a disease so formidable? The great obstacle to efficient cure in insanity, with all our enlightenment on the subject, is the element of time. If it has taken so long to impress the public mind with the essential nature of the time element in a disease so plainly marked as insanity, what can be expected in inebriety, which even now, many refuse to recognise as a disease.

While on the subject of treatment of inebriates in lunatic asylums, I state, on the authority of Dr. Norman Kerr ("Inebriety"), that an attempt is being made to treat inebriates in lunatic asylums in New Zealand. They are kept in separate wards, and do not mingle with the insane. The combination has very much to recommend it. There is no need to agitate and wait for the erection of retreats, as the

asylums are accessible to every part of the country. There is only one objection that I can see to this combination—but that is likely to militate very strongly against voluntary seclusion—and that is, that the attainder of insanity is likely to attach to inebriates who have been treated in lunatic asylums. The experiment will be watched with great interest.

But to return, the only chance of securing effectually the two conditions referred to, seems to be to place the inebriate in a home or retreat. Here he would be relieved from the upbraidings and reproaches of relatives who, believing that it is only want of will that stands between him and cure, cannot keep from aggravating and annoying. In a retreat, too, it ought to be possible to bring to bear on the inebriate all the resources of medicine and hygiene, and so greatly expedite the process of repair and the restoration of healthy function. It would be presumptuous in me to enter into details of treatment, even did time allow.

It is of the last importance, if restoration is to be accomplished, that the co-operation of the patient himself should be obtained. "Who would be free, himself must strike the blow," is very pertinent to the case of the inebriate. If there be no strong desire for cure on the part of the patient, then indeed is the case a desperate one. But fortunately, this desire is seldom absent. It is necessary by little—and little it may be—but it is necessary that the patient be fully informed of the grave disease of which he is the subject. He should know his family history—the failing, or vices, or diseases of his immediate ancestry ; the necessity, if ever he is again successfully to face the temptations and troubles of life, of obtaining a radical cure. Above all, he should be taught to recognise the physical and mental conditions that herald an attack of the craving. Nor are the aids of religion and morality, though in themselves impotent to suddenly bring about a cure of a diseased condition, to be despised. Those who believe in the possibility of Divine aid being extended to the distressed, may by prayer be greatly strengthened in their attempts at reformation. If the physical state of the inebriate is such as I have described, the utter uselessness of antidotes for the drink-craving, and of the belauded specifics, must be at once apparent. The Turkish bath, cinchona rubra, raw-meat diet, all valuable as adjuncts to treatment, are in themselves valueless, as experience has well proved.

In Victoria, South Australia and New Zealand, the laws give ample opportunity to deal with inebriates, either by voluntary or compulsory seclusion in asylums or retreats. In New South Wales and Queensland similar legislation is promised. It is only a few months since a similar law was placed in the English Statute-book. Legislation then is fairly abreast, if not ahead, of public opinion. But there is much necessity for the education of public opinion on this subject. There are many inebriates in the colonies where retreats have been by law established, but how few seem anxious to avail themselves of them. We must recognise that most inheritors of the alcoholic diathesis are ignorant of the fact. Many have a dim idea that their indulgence in drink is more than a craving—that it is a disease ; but even so, it is a disease for which there is no cure.

As a profession, it is only within a few years back that we have given in our adhesion to the disease origin of the drink craving, if some are not even now avowed sceptics ; and if so, what can we expect in the general public? If inebriates are to be effectually helped, it can only be by public opinion being enlightened on the subject. The press is doubtless the best educator of public opinion. In England and America, there are established societies for the study of inebriety. Similar societies might well be tried here. Just as our Health Societies popularise the laws of health, so might such societies popularise the laws of inebriety. Whatever means we employ, efforts ought to be made to extend to the inebriate—than whom none more deserves our pity—a helping hand. We should do our duty by the inebriate, as we have already done by those afflicted with a similar malady—the insane. Provision should be made for rich and poor alike in asylums or retreats. I am not referring—in naming asylums or retreats as the only satisfactory mode of treatment—to the ordinary drunkard or tippler, for if so, then no number of institutions that we could erect would be sufficient to contain them.

The provision for the true inebriate, whether rich or poor, would no doubt entail considerable outlay; and yet, not so much as might at first sight appear. For a large number of the police-court drunkards—a proportion of whom are, no doubt, diseased—are already a public burden, for when not in gaol, they live on private charity. They cost the country more than if they were systematically maintained by it. A sufficiently long period of detention, during which they might be compelled to work, might effect a cure. Coming to the skilled mechanic or ordinary wage-earning inebriate, the labour that could be done by such while in seclusion might amount to little short of maintaining him. A certain proportion of inebriates, socially higher than those mentioned, might be paid for by friends to the full, so that the expense of maintenance would be small in comparison to the good effected directly, and the indirect gain would be even greater. But into details of such a scheme, it is impossible here to enter.

But it may be asked—What are the actual results from the establishment of retreats? The movement for the rescue of the inebriate is only of yesterday, and statistics cannot be other than meagre as yet. Dr. T. D. Crothers of America, at the Colonial and International Congress on Inebriety held in London last year, stated that out of 3000 cases of inebriety treated in American institutions, nearly forty per cent. were restored and temperate after a period of from six to eight years from the time of their discharge. The results of treatment at the Dalrymple Home in England are given as 42 per cent. of recoveries, out of a total of eighty-two under treatment. A percentage of 35 of permanent cures is considered a fair general average in the case of those who remain under treatment for one year. There is a very close approximation to the general average of cures among the insane. These results are, considering the difficulties attending the inception of a new system, eminently satisfactory.

Our great hope in coping with this formidable ailment, which threatens to sap the physique of our own generation specially, is in the diffusion of a more accurate knowledge of the effects of alcohol on the system. The ignorance that prevails on this point in the popular

mind is simply incredible. Were the disease-producing qualities of alcohol better understood, many now on the high road to inebriety would recognise their own symptoms, at a stage when they were curable. Many who are advanced in disease would submit themselves to curative means. We might almost despair of ever sufficiently educating public opinion on inebriety, had we not before us the history of the long battle that had to be fought ere due provision was made for the scientific treatment of insanity.

The propositions which I have very briefly and very imperfectly tried to establish are these :—That the inordinate craving for intoxication, which is irresistible, has its *fons et origo* in the alcoholic diathesis or temperament, a subdivision of the neurotic group of diatheses; that intoxication is merely a symptom or outward expression of an internal morbid state, and is not itself the disease; that the originating causes of inebriety are so analogous to those of insanity, as to warrant the inference that, if the one is a physical disease, so is the other; that the essential conditions of successful treatment are two—viz., the absolute prohibition to the patient of alcohol, and the granting of sufficient time for the reparation of diseased tissue and restoration of lost function; and that asylums or retreats afford the best means of securing the fulfilment of these conditions.

The paper was well received, and all were agreed that treatment, to be successful, must carry with it the co-operation of the patient, and that treatment away from home was absolutely necessary. The association of inebriates and the insane was strongly decried, a separate institution being clearly requisite. It was approved that the law should allow some authority, such as a judge or justice, on proof being shown, to commit the patient for treatment: and that treatment, to be effective, should be for at least one year.

Dr. Patrick Smith briefly replied.

A CONTRIBUTION TO THE STUDY OF INEBRIETY.

By Charles McCarthy, M.D., Inebriate Retreat, Northcote, Melbourne.

Hon. Member, American Association for Cure of Inebriates. Hon. Member, Council of the Society for the Study and Cure of Inebriety in England.

As to statistics of cure, they are valueless unless based on large numbers in inebriety, where the public demand a new definition of cure, namely, its permanency. The inebriate has such a craving for stimulants or narcotics, &c., that if not under restraint, he cannot refrain from over indulgence; the drunkard can, if he choose.

The inebriate is suffering from disease of the nervous system—he is labouring under moral insanity. There is no inebriety in a medical sense without disease of the brain, either functional or structural. The

man may appear to reason well, but though his language may be sane, his conduct is insane. Generally speaking, no exhortation, no consideration (temporal or spiritual), no ruin staring him in the face, no affection for family will weigh with him; indulge he must, and will, until he becomes helpless. Consequences are nothing to him before indulgence, and everything after; then his remorse imposes on his friends, who determine to give him another trial. But, alas! the paroxysms and the scenes are repeated until he dies, or becomes insane.

To say that this state depends on vice, betrays extreme ignorance. It may have been so at first, but it is disease now.

What are the causes of inebriety? They are numerous. The most frequent cause is indulgence in alcohol acting on a constitution predisposed to nervous disease; were it not for this predisposition, the person's excessive indulgence may terminate in lunacy or death, without his becoming an inebriate. Next to this, and nearly allied to it, but much more difficult to cure, are hereditary cases, which are very frequently periodical. This heredity may be from parents or grandparents, or from more remote sources. There is nothing strange in this. I have often called the attention of parents to the fact that the new-born babe did not resemble either of them, when I was informed that it resembled an uncle or an aunt, or more distant relative. It is quite certain that all children inherit some taint or peculiarity of their parents or relatives—some children one thing, some another. When the father and mother are both drunkards before the child's conception, there is great probability that the child's nature will be degraded, so that it may be born an idiot; or, when grown up, become imbecile, consumptive, an inebriate, a drunkard, or a criminal, the source of whose misfortune is never dreamed of. Many of this class inhabit the jails, the lunatic asylums, or end their lives on the gallows.

It is not outside this consideration to state that the neglect of early religious and moral training and education will very materially tend to insure and accelerate the degradation necessarily resulting from heredity and over-indulgence, and at the same time certainly impede, if not hinder, the cure of inebriates. I think it very improbable that an inebriate who does not believe in a future judgement, can be cured, as he has no motive strong enough to induce him to have recourse to any self-denial, which is certainly necessary as an adjuvant in effecting permanent cure. This is no contradiction of the view, that inebriety is a disease, as our lunacy doctors well know and utilise in practice.

This question of heredity as to drink, profligacy, lunacy, ignorance, indulgence, and all inherited unhealthy states and diseases, is a question of the utmost importance, and should engage the serious consideration of legislators, and of all those who wish well to posterity. This is of more importance than the interest of the liquor trade. As inebriety is a frequent cause of insanity, so may it also be a symptom of insanity. Sunstroke, shock, grief, melancholy, remorse, debilitating diseases, injury to the brain, in fact any cause that may produce insanity, may be the cause of inebriety. A sound mind requires a sound brain and healthy body; yes, and healthy ancestors, those who have marriageable sons or daughters, should not forget this. I need say no more, nor perhaps so much, to a medical audience, but others may profit by these warning remarks, which are free of all technicalities.

What is to be done about inebriety? Let the medical profession insist upon the establishment of inebriate retreats, suitable for all classes; the Chief Secretary said last month that if Parliament desired it, he would establish them. Let the medical profession, the only persons capable of viewing this matter in all its bearings, speak out on the subject. It has latterly been the custom here to exclude medical men from Commissions on subjects which they only know anything of, and the consequence is that from want of knowledge, recommendations are made to Parliament by Commissions of laymen, and members of Parliament think they ought to carry out these recommendations as if they were made by experts (see the absurd blunders and mistakes of the New Inebriates' Act passed a few days ago; it must be amended next session). I need scarcely say anything as to the medical treatment, my main dependence being on time. I give no hope of cure in less than three months in the mildest case, six months being required in the majority of cases, and twelve months, or longer, in bad cases; yet the new Act says three months must be the maximum time! but says thoughtlessly, the time may be prolonged if a wife and two medical men each make a solemn declaration, that the man that has lived in the retreat for three months is not cured!!

Again it says, that if the patient be out for a time with the Superintendent's consent, he shall be punished by being kept in longer. Again it says, the patient may be detained until as hereinafter provided; that hereinafter refers to Sect. 10 of the old Act, which is omitted in the new. The same ignorance appears in the Lunacy Amendment Act; more faith is placed in ignorant jurymen than in medical men. The fact is, that many members of the community who have access to the public press feel it their duty to make a greater sensation when they hear of a case of doubtful insanity being sent to the asylum, than if that same lunatic committed half a dozen murders before his arrest; but presumption is always accompanied by ignorance. I may here be permitted to state, that for many years I have been of opinion that where lunacy is pleaded in a capital case, the jury ought to be composed exclusively of medical experts. There has been a popular opinion, that women are more difficult to cure of inebriety than men. That has not been my experience; women are certainly more easily managed in a retreat than men, and I think as easily cured, if not more so, than men. For sixteen years that the retreat is open, I never had a death among my female patients, and very few among the males; only two males I think directly from drink.

There is no mystery about the treatment, and I therefore shall not detain you with it. Australian youths are decidedly more opposed to discipline than Europeans, and therefore more difficult of cure. Any opinion formed from practice outside a retreat as to the curability of men or women of any age, is of no value, from the fact that alcohol cannot be kept from them; confinement in a jail does not meet the question. My own opinion is, that men and women of any age can be cured if sufficient time be afforded. I believe that twelve months in a retreat will cure 80 per cent., six months 60 per cent., three months 30 per cent., but in a shorter time than three months, I only expect recovery, not cure. Too frequent visits, and too much correspondence, will hinder cure. Vicious patients are mostly drunkards, and require

years for cure; a penitentiary is their proper place, not an inebriate retreat.

I shall now, with your permission, venture to make a few remarks that may be useful to the younger members of the profession, in relation to drink. The first is, that if they are called to a suckling baby in convulsions, they make special enquiry as to whether the mother takes gin, especially if there be a succession of convulsions. Another is, never to recommend spirits of any kind to a nurse for the sake of the child, under the impression that it would improve her milk in quantity or quality; any nurse that cannot do without alcohol, ought not to suckle at all. Be extremely careful in prescribing spirits to patients, whatever quantity you order will be exceeded and continued longer than you intended. Women will absolutely deny to the medical man, even to their husbands, that they take alcohol to excess, or at all, but attribute their state to nervous debility. When you find a man, especially a publican, who cannot take his breakfast without alcohol, tell him he is on the straight road to inebriety. Warn the police not to put a man helplessly drunk into a cold cell; discourage the use and abuse of tobacco, as well as of alcohol, by example and advice; do these things as a conscientious and moral duty, and when so acting, fear not pecuniary consequences. The trust and confidence bestowed by patients on conscientious medical men is extraordinary, and where offence is taken against moral advice, the medical man feels that he performed a sacred duty.

AUSTRALIAN LUNATIC ASYLUMS—REMARKS ON THEIR ECONOMIC MANAGEMENT IN THE FUTURE.

By W. L. Cleland, M.B., Ch. M. Edin.

Resident Medical Officer, Parkside Lunatic Asylum, South Australia.

In selecting a subject for the consideration of this Section of Psychological Medicine, I have endeavoured to choose such a one as would have a distinct bearing on the fact, that this Association is an Intercolonial Australian Medical Congress. As Australian alienists, we have to deal with two important factors pertaining:—

(*a*) To the social and political constitution of the people, which is essentially democratic.

(*b*) To climatic influences, which admit of a continuous out-of-door life.

It will be the object of the following remarks, to point out how one or both of these factors cannot but fail to produce its impression on the management of the asylums of the future. Those who are wise, will not wait to have these impressions rudely thrust upon them by an imperious necessity, but by a timely provision will so arrange their ordering as to be found standing "at attention" when the searching light of public criticism sweeps over them. It will therefore not be

unbecoming to enquire on what lines should the management of lunatic asylums be most justified in striking out a course, that shall be essentially Australian in its character, and practical in its aims.

It must be admitted, that in the Australian colonies the tone of society is more essentially democratic than in the mother country. This, consequently, cannot fail to produce a certain influence on the position of the Medical Superintendent of any large institution for the insane, as regards the public at large. One of the peculiarities of a pronounced democratic form of society, is to discount or even to question any prescriptive right that may be advanced by any particular individual or class of individuals. Hence, is noted a certain intolerance of any professional assumption. The democrat cries out, away with your titles and professions and parchment certificates, and let us see what you can do, and to that extent we will believe in you.

How does this affect the relation of the medical man to the care of the insane? To a medical audience, to assert that lunacy is a disease of the brain, and that lunatic asylums are really hospitals for the insane, is to give utterance to bald platitudes. Such assertions do not carry the same indisputable weight to the ordinary lay mind. It may be possible that there is a glimmering perception on the part of the public of the truth of insanity being a disease of the brain in acute cases, and that such are best under medical supervision. With respect to the chronic insane, who may be more or less manageable and quiet, the fact to the uneducated mind is less obvious. Thus we find the democratic economist asking, Why engage expensive medical supervision for those who only require the shelter of a workhouse? There is here such a radical misconception or ignorance of the nature of insanity, that argument or counter-assertion would be equally thrown away. Before anything could be done to eradicate such a false conception, it would be necessary first to carefully educate the would-be economist in some of the first principles of psychology. If our democrat were some Hodge between the stilts of a plough, he might be passed by without further comment; but when, as not infrequently happens, he stands in the position of a political master, the situation becomes much more serious. And this is not an idle fear, for we have only to turn to the United States of America to see that in many instances this has been the logical outcome of this ignorance of first principles as regards the insane. The medical element has been reduced to periodical visits to the ostensibly sick, and not to superintend the management of those suffering from chronically diseased brains. Even though it be admitted that, exceptionally, a layman might be found who would enter upon his duties of superintendence with the requisite intelligence and largeness of views, yet what in him would be almost phenomenal, would in a well educated medical man be simply a natural outcome of his previous training, and be to him, as it were, a second nature.

To guard against this danger of lay-superintendence, it must be made patently obvious to the most ignorant, that no one, excepting a medical man, is fit or capable of managing a lunatic asylum. It might be argued that there is already provision made for this in the various Australian Lunacy Acts. But this would be but a poor safeguard, for in unsettled social conditions, an Act of Parliament can be as easily expunged from the Statute Book, as it can be pitchforked into it. Nothing will stand

the ordeal of public criticism, but what is manifestly on the face of it indispensable. The safety would therefore lie in making the asylum arrangements suitable both for acute and chronic cases. It will always be admitted that the former should be under medical superintendence, and for the sake of economy of supervision, the laity will not object to the chronic insane being also included under the same management. This implies, that the asylums of the future must not be below a certain size, say a minimum of 800 patients. Much has been said respecting the advantages of small institutions, especially for acute cases. All these advantages can be easily secured by appropriate arrangement, and isolation of the respective wards and airing courts. A distance of 300 or 400 yards is as effective a barrier to intercourse as a corresponding number of miles, and yet the former allows of one supervision. The model arrangement would consequently partake of the village character, with a small strong portion for acute cases. To allow of the requisite dispersion of buildings, a large area of ground would be a *sine quâ non.* The advantages of such an arrangement did not fail to strike so intelligent and receptive an observer as Dr. Hack Tuke in his visit to the Kankaka Asylum, Illinois, U.S. He says "it is a pleasant thing to see this breaking up of buildings on so extensive a scale. It must do good. The air blows more freely and freshly through this group of houses, which will soon form a little village, than it would, or could, through monster structures filled from top to bottom with the insane." To this asylum there are attached about 480 acres of land. It contains 600 patients at present, and is designed to accommodate 1500. If this "very interesting experiment" should fail to accomplish all that is expected of it in the future, it will, I am sure, be wholly attributable to the relatively small amount of land attached to it. Some fifteen years before the Kankaka Asylum was thought of, the South Australian Government, acting under the enlightened advice of the then Colonial surgeon, the late Dr. R. W. Moore, caused the Parkside Lunatic Asylum to be built on the "segregation" principle. The asylum is not yet completed, but is estimated to accommodate about 800 patients. It already partakes of the appearance of a village, as the buildings are evenly distributed over the area of 135 acres of land. All that Dr. Tuke says of Kankaka, applies with equal force and truth to Parkside. The defects of the place are, a too expensive and elaborate main building, and a too small endowment of land.

This brings us to the consideration of what should be the effect on management of our special climatic conditions. For in the lunatic, we have to deal with a sick person, who differs from all other sick persons in being benefited by work or employment of some kind. In such an asylum for acute and chronic cases as has been held up as a model, there would be at least from 70 to 80 per cent. of the inmates available for some industry. The nature of the climate, which allows of continuous out-of-door life, points to such industries as gardening and ordinary farming work. No more healthy and desirable occupations for a diseased mind could possibly be imagined. We have here then two important points—(*a*) labour of a certain kind and amount; (*b*) climatic surroundings exactly suited to the employment of that labour to the best advantage. This, however, is not enough. A third important point is requisite, namely—(*c*) turning the labour to a profitable account.

The tendency of public opinion is to rebel at all unproductive expenditure; hence, every now and then some euthanistic theory is advanced for the weeding out of unproductive humanity. But whilst such theories are never likely to become popular, yet on the other hand, any schemes that would have for their aim the causing of the individual to produce his own food and raiment would ever be received with enthusiastic approval. In fact, this is the avowed object of the most advanced socialistic and communistic theories of the present day. This has evidently been the underlying principle in the management of many of the lunatic asylums and prisons of the United States of America; and in some cases, the application has been attended with marked success in reducing expenditure. It appears to me that unfortunately a radical error crept into these efforts, or rather was in the methods used by which the object was to be attained. The conception of the idea of making these institutions self-supporting was a thoroughly sound one; the channels into which the efforts were directed were, in my opinion, undesirable. These latter, in many instances, partook of the nature of handicrafts, or ordinary artisan work. As long as this was simply to supply the needs of the place, no objection could be taken; but naturally, the requirements of these institutions for such products were quickly satisfied, and a surplus became available. This excess of production over consumption could not be converted into something eatable or wearable without being first sold. This at once implied coming into collision or competition with other producers of similar produce. These, in democratic communities, are frequently a large and demonstrative section of society. It was, therefore, not long before an outcry was made that the State was unduly competing with their industry, and taking the bread from the mouths of their children. Such a thing could not be tolerated, and the sale of these articles was prohibited in the country in which they were manufactured. If, instead of making such articles as wooden buckets, &c., the above institutions had devoted their energies to producing bread and meat and material for clothing, no adverse comment would ever have been made. As long as production is confined to supplying the daily wants of the inmates, no section of society will ever object.

Australian society will urge the desirability of making Government lunatic asylums self-supporting; the Australian climate, with a beaming countenance, already says—Why not? the Australian sun daily pouring upon the land inexhaustible supplies of radiant energy sufficient to warm into life the most slothful and apathetic, encourages us to try. Water may be always had for the sinking; and our soils are unsurpassed for productiveness in any portion of the world. Will society be far wrong then in making this demand, when such requisites exist as labour, climate, sun, water, and soil. The indications then point unmistakeably to the production of the necessaries of life.

To what extent can this be done? The answer to this question will depend largely on how it is done. If the attempt is to be made a success, the ordinary Australian methods of tillage must be carefully avoided; and we must look elsewhere for a model. Such examples worthy of being imitated may be found occasionally in England, but to a greater extent on the Continent of Europe. These are comprised under the method known as the "culture maraichère," the essence of the system

being to create for the plant a porous and nutritive soil, containing the necessary decaying organic and inorganic compounds, under conditions of temperature and moisture, superior to those existing in unaided natural surroundings. Social economists assure us that " with cultural methods already used on a large scale, a thousand human beings living on a square mile (640 acres), could easily, without any kind of overwork, obtain from that area a luxurious vegetable and animal food, as well as the flax, wool, hides, &c., necessary for their clothing." An important requisite is, therefore, an approved method of tillage.

Before we can till, a suitable area of ground must be secured. What should be approximately its extent? As a working example, we may limit our attention to the size of a lunatic asylum that might be conveniently worked by two medical men. This would be one capable of accommodating about 800 patients. The area of ground required for such an asylum should not be less than one square mile (640 acres); and the whole of the grounds not required for buildings and airing courts, should be under the above high system of culture. It is not to be supposed for a moment that any institution would attempt to undertake to do this at a bound. Here, as in other things, a gradual growth and development towards an ideal should be the aim. Existing institutions should try, to the extent of their area of available ground, to produce a corresponding amount of food value; and thus help to demonstrate the feasibility of procuring the whole of the necessaries of life, from an area of ground suited to their number of patients. Again, all future asylums should from the first be provided with an area of ground suitable for their contemplated size.

The first attempts would naturally be to produce some of the more easily obtained articles, such as milk, eggs, and butter, a trio that, in an institution for 800 patients, would represent the respectable sum of something like £2000 per annum. This should be practicable with any asylum of like number of patients, that has, exclusive of ground taken up by buildings and pleasure grounds, an area of arable land of fifty acres in extent. At the same time, the production of the necessary fruit and vegetables, jams made with honey instead of sugar, osiers for baskets, tobacco, oil and fat for soap, and fibre plants for mats, &c., would come as a matter of course. These things would monopolise something like 100 acres of our contemplated square mile (640 acres)

The next article to be attacked, in the natural order of things, would be the meat bills, representing, as it would, some £4000 per annum. By the system of culture advocated, every acre of land should return at least from 1000 to 1500 lbs. of meat per annum. To obtain the total quantity, some 200 acres would have to be devoted to this. As supplementary, would be the keeping of pigs on the asylum and garden refuse. Grazing cattle would be out of the question, but stall feeding would have to take its place. The hides from the animals would contribute largely to defray the boot and shoe account of £1000.

The next important item on the diet scale would be the bread account of £1800 per annum. An area of ground equal to that required for the production of meat would, in all probability, be wanted for the production of wheat, if something like ten bushels were allowed as the yearly consumption per head. This, in addition to flour, would give a large

quantity of bran and pollard, so that a portion of this area might be put down to the credit of the milk, butter, and meat accounts.

This leaves a balance of 140 acres still unutilised. The produce from this, forming surplus quantities, could be sold or exchanged, without interfering with private enterprise, because the respective amounts would be comparatively small and diversified; and belonging to the class of the necessaries of life, would never produce any noticeable effect on the market, nor bring the asylum into hostile competition with small producers.

In addition to these natural products, would be the numberless mechanical employments—such as making clothing and boots, mats, baskets, &c.—which together constitute a considerable item in asylum expenditure.

If the idea is to be carried out successfully, the superintendance of these industries must not be left to the direction of an ordinary bailiff or steward. Such an official, however zealous he might be, would not have those qualifications that would fit him for utilising the work of insane labourers. From his natural up-bringing, he would look at the matter from the wrong end. The produce and not the producer would absorb his attention. His views and those of the Medical Superintendent would be as wide as the Poles. All will admit, that in a lunatic asylum there must be no dual control, but the management must be essentially an autocratic one. As Conolly, of Hanwell, remarked, "the regulation of the employment of patients, is the regulation of a highly important remedy, and should never be attempted without the physician's assistance. . . . . Constant and regular work cannot properly be exacted from insane persons; and they should not be kept at work as many hours as sane people." The kind of asylum advocated in these remarks, would exactly supply the want felt by Dr. Conolly to exist in his day, as is shown by the following quotation from his "Reports":— "Many of the incurable patients work so steadily and tranquilly, and many of the convalescent are capable of regular employment, so long before they are altogether fit to take care of themselves, that it is impossible not to wish to see some establishments founded, intermediate between asylums and ordinary life, in which profitable labour could be supplied to some for a short time, and to others for a longer period." The principle of "segregation," accompanied with a suitable endowment of land, meets these requirements in every respect.

It is thus evident, that the Medical Superintendent should not only understand the physical necessities of his patients, so that their labours should be collectively and respectively beneficial to them; but he should also have an intelligent comprehension of the *rationale* of the various cultural processes. Unless the work of an asylum were thus supervised, it would in a short time degenerate into a form of white slavery, and be brought into disrepute. If it is difficult now to get a thoroughly capable all-round superintendent, the fear is that in the future it may become still harder. Twenty-five years ago, Griesinger of Berlin, gave a sufficiently long list of the necessary qualifications for a Medical Superintendent of a lunatic asylum. "At the head of the *personnel*" he says, "stands the superintending physician, by whose character as a man and as a scholar, the pervading influence in the institution in a great measure depends. Side by side with the grand essential of a

thorough acquaintance with medicine, there is required in the head physician, and justly expected of him, a rare combination of moral excellencies—benevolence, great patience, self-command, freedom from prejudice, a knowledge of men gained by actual experience of the world, conversational powers, and a decided liking for his own special vocation." To this long list must now be added a thorough grounding in the chemical and physical sciences, and their application to general physiology. We may indeed be excused for having a certain feeling of hopelessness, as we look around to see if we can discern anywhere signs of such an "Admirable Crichton." Fortunately, able and scientific men are more frequently made than found ready born, so that there is a prospect that when the demand becomes urgent, the man will be forthcoming.

A concluding consideration yet remains, and this is to ask why the fees received in aid of maintenance from patients' friends bear so small a ratio to the total cost. It surely ought to be one of our Australian features, that the relatives or friends of nearly every patient should be able to contribute something. It can hardly be conceived, that there are many families who could not pay a penny a day, or sevenpence per week. And yet this insignificant sum is not to be despised, for on 800 patients it represents £1200 per annum. Now what do we find to be the existing state of matters as regards the maintenance fees received at our public asylums. Take those of South Australia as an illustration. We find that out of some 750 patients less than forty pay anything at all. The receipts from this small number give an average of twopence per head per day. For every penny per diem per capitem that the remaining 700 could be made to pay, the cost of maintenance to the State would be lessened by £1000. It would seem that not enough value has been placed on these small helps towards maintenance in the past; and there can be no doubt but that a stricter attention to them in the future would mean a considerable annual saving in the cost of lunatic asylums generally. Instead of South Australia being remiss in this respect, I believe I am correct in saying that it compares very favourably with other Australian colonies. Considering the well-to-do character of the Australian labouring classes, it should be one of our Australian characteristics that patients' friends contributed largely towards their maintenance. No asylum management should rest satisfied until these fees were sufficient to meet the expenditure incurred in salaries and wages. This would then leave all produce to be devoted to the use of the patients themselves.

As a corollary on the remarks about our climate admitting of an open-door life, the accommodation for those patients who are unable to be employed productively, should be of such a character as to allow of an abundance of life in the open air. To this end, the airing-courts should be large and roomy, and, where practicable, be laid out in the form of extensive gardens. The dining or day rooms should form an integral portion of these courts, and be totally disconnected from the dormitories. This arrangement allows of the sleeping rooms being thoroughly purified during the day time by means of open windows, and prevents them ever becoming contaminated by the smell of food or tobacco.

The foregoing remarks have been an attempt on my part to put in a concrete form views that I have held for some years with respect to

management. They do not pretend to be new or original, but as far as I know, the experiment of putting them fully to the test has not yet been made by any superintendent in Australia. If they meet with your sympathetic appreciation, I feel that already much will have been gained, and that it will only remain a question of time to make them accomplished facts.

The general views of the writer were commended, but some doubt was expressed as to the practicability of carrying out Dr. Cleland's scheme, which was looked upon as idyllic.

LUNACY LEGISLATION IN THE AUSTRALIAN COLONIES.

By William Armstrong, M.D., Ch. B.

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The paper which I have the honour to read before the Psychological Section of this Congress, is most comprehensive in its title, and so demands an early definition of its scope. I may state that when I first undertook to write it, my intention was to show what would be necessary to render the lunacy statutes of the different Australian colonies capable of codification, so that one universal law for dealing with the insane could be adopted, but I found the task much more difficult and extensive than I had anticipated, and have had to content myself with a history of the existing statutes, with short comments upon their resemblances, and the apparent origin of their main features. Descending more into particulars, I have also compared the most essential points in the different processes of the methods of committal, detention, and discharge in vogue. We can then readily see how far our statutes are alike in these matters, and in what they differ, and form opinions as to their respective advantages, when thus placed in juxtaposition.

I think the present a fitting opportunity to initiate the making of such comparisons, as it is well to take time by the forelock, in view of the greater uniformity of legislation that will be advisable, in the event of the much talked-of federation of the colonies becoming *un fait accompli.* It can then only be a disadvantage to be in the condition of the United States of America, which are very far from possessing uniform lunacy laws, *e.g.*, before a patient can be admitted, one State requires two physicians' certificates, another only one, a third none at all, but a judge's certificate; while a fourth adopts a method than which none can be conceived more objectionable, viz., trial by jury. In our colonies, as will subsequently appear, there is already sufficient diversity in the lunacy laws without luckily such absurd incongruity. Until quite recently I had not studied the legislation of the other colonies, and must confess I was rather taken aback by the mass of statutes that had been

framed, and had to be read before comparisons could be instituted. I never before so clearly recognised the latent tendency within me as a Victorian native, "to blow," until I felt with what hardness of belief it gradually dawned upon me that for some years past almost all the other colonies had been much in advance of Victoria in the completeness of their lunacy laws. But for the passage of the Amending Statute at the end of last year, Victoria would have occupied a very humiliating position, for the want of attention bestowed upon this important subject. That it should have been so is not in the least surprising, when one recalls the systematic neglect until recent years with which the insane had been treated in Victoria. In other matters, anything was thought good enough for them, and the repeated requests of asylum officers for better accommodation and means of treatment were constantly turned a deaf ear to. Moreover, one of our most prominent legislators, and who of late years has longest held the reins of office, viewed the position of medical men as alienist physicians, with unconcealed contempt. When in power, he reduced the medical staff, which is at present even considerably undermanned, to a point at which scientific work was impracticable. He also made no secret of his desire to adopt the retrograde step of lay superintendence, and was only prevented by the fortuitous circumstance of political exigency from proposing to Parliament, and probably effecting the alteration of the law required for this purpose. So long indeed as his party remained in power, the asylum at Sunbury was visited only by an extra physician, the law being evaded by dubbing an attendant officer-in-charge, instead of appointing a superintendent, who would of necessity have been a medical man. I am glad to find that in the colonies generally the law distinctly requires that the medical officer of a public asylum shall be superintendent. In New Zealand and Tasmania alone is there a possibility of it being otherwise; but in these colonies, although the law is less stringent, the superintendent may be also the medical officer, and I believe I am correct in saying that he is so in every instance.

The ministerial attitude has been a very considerable factor in checking the development of a scientific spirit in the medical officers of Victorian asylums. The staff has been kept at such a low limit, that superintendents have not time for anything but the necessary routine duty. It has been the almost invariable rule also, that medical officers have entered the service with the fixed determination not to remain, as their salaries are fixed at an unremunerative point. There are, consequently, very frequent changes in the medical staff; and a superintendent has no sooner got his assistant to take an interest in his work than he loses him by transfer, if not resignation. What scientific research, I might ask, has been practicable to our able secretary during the last three months, when in sole charge of an asylum with over 500 inmates, and a new admission late of from 80 to 100 per annum? When the medical staff is at this low rate, is it any wonder that so far we have only had three members of it present at meetings of this section of the Congress?

I will now proceed with the subject matter of my paper, simply prefacing it with the remark that my comparisons are obtained from a consideration of the statute laws of the different colonies, and not from their asylum reports.

Many of the methods of legally dealing with the insane are common to all the colonies; others are common to a group of colonies; while a

few are peculiar to one colony. If the existing Acts be read in chronological order, it will be readily traced that each colony has largely borrowed from the one that legislated immediately before it. Each successive Act has usually marked a distinct advance, and has, in turn, served its successors as a starting-point.

The earliest statute that still remains in force is that of Tasmania, passed in 1858. It was amended in 1885, but only with respect to the machinery of administration. The old Commissioners were then replaced by a board of official visitors, who are directly responsible to the Government for the administration of the principal Act.

In 1864, South Australia passed her statute, which is a model of completeness as far as it goes, and should, I think, be capable of easy administration. Here a very good example was set by the draughtsman in having the sections clearly subdivided, making the Act easily read. The main features are to be found embodied in the next piece of colonial legislation—the Victorian Act of 1867—but were more faithfully copied by Western Australia in 1871. In neither case was the same clear subdivision adopted, so that the proper interpretation of the sections is no easy matter, and the hurried clerks of petty sessions make frequent mistakes in drawing out the warrants—in Victoria, at least.

The first distinct colonial departure was made in 1878 when, owing to the energy and ability of our worthy President (Dr. Manning) New South Wales passed an Act which has been in great measure the basis of all subsequent legislation. Its newest feature, the establishment of reception houses for the temporary treatment of the insane, has met with world-wide approval, and been incorporated in the laws of New Zealand, Queensland, and Victoria. The Act also provided for the establishment of the first separate hospitals for criminal insane, the laws relating to whom were first brought together in a separate section. The distinct advance then made did not long satisfy Dr. Manning, as in 1881 he inspired the passage of a short amending Bill, with the humane clauses—(1) that first offenders, including attempted suicides, should not be sent to a criminal asylum; and (2) a still more beneficent one, providing that attempted suicides should not be prosecuted after mental recovery.

New Zealand passed a very complete statute in 1882, but it has debateable clauses quite distinct from those of any other colony. Its special feature is the prominence given to legal authority both in committal and discharge. The resident magistrate, or in his absence two justices, must authorise even the committal of a patient sent voluntarily by his friends; and also has to authorise the discharge. It is the first Act providing for the boarding out of patients; but its clauses apply only to recently-committed patients before being sent to an asylum, and must be rather a dead letter, I should imagine. Recent cases of insanity would certainly not thus be placed under the most favourable conditions for recovery. Few chronic cases could be safely recommended as suitable for boarding out, before they had undergone a period of trial in an asylum.

It is the only lunacy act that retains clauses under which habitual drunkards as such may be treated in lunatic asylums. This is admittedly a mistake on two grounds. The undeserved stigma of insanity readily

attaches itself to the children; as for the patient himself, there is a great tendency to too early release, and consequent relapse, as the asylum-made lunatic argument is powerfully urged by friends. The Inebriate Asylum Act 1888, just passed by Victoria, allows a lunatic asylum, or any part of it, to be set apart for the reception of inebriates, but it is expected that this clause will only be brought into operation in the country districts. Queensland passed her Act in 1884, and made a clean sweep of all previous laws, repealing no less than six others, and portion of a seventh. She wisely was content to follow the excellent lead of New South Wales, and faithfully adopted the main features of her Act.

Victoria has the latest and most radical piece of lunacy legislation in the Amending Bill, which came into operation on the 1st inst. The Bill is without doubt a substantial advance upon the principal Act of 1867, although superintendents hoped for a larger instalment after the exhaustive labours and strong recommendations of the late Lunacy Commission. Given more power, they could without doubt effect great reforms, ameliorate the condition of their unfortunate charges, and have infinitely more time to devote to the advancement of science. The repression of questions that would have led to fierce debate has had its advantages, as the Bill has practically been passed as drafted. Its principles, therefore, will have a fair trial; but the effect of many of its provisions remains to be seen, and certainly they have not been adopted with the full concurrence of the profession. Receiving houses and an asylum for the criminal insane are adopted as elsewhere; regulations for boarding-out are provided as a means of relief to the over-crowding. Its most striking feature, however, is a more elaborate attempt than has hitherto been made to eliminate, as far as possible, the pernicious principle of profit in regard to the treatment and maintenance of lunatics. This is by provision for the gradual abolition of licensed houses, for all but the reception of a single lunatic. The feeling that individual liberty was menaced by the pre-existing law, must have been at the bottom of many of the clauses of the Act. It certainly does not require any great stretch of the imagination to view lunacy law as excessively dangerous to the liberty of the subject. All will agree that personal liberty should be hedged about by every safeguard, with which the law and public opinion can environ it. But I think we will all agree, the facts are wanting in this country to justify the wholesale sweeping away of private asylums, which have done much good in their time, and the want of which has in this Colony been severely felt. Personally, as a matter of sentiment, I approve of the change, and would do so more heartily could I hope that the Government Pay Cottages would be as well equipped as a private asylum. It remains to be seen to what extent the entirely new privilege of establishing philanthropic hospitals will be availed of by those charitably disposed towards the insane.

Legal machinery, for the committal of insane persons, is separately provided for by three great streams of admissions, according to the agency which brings them, and these are further subdivided, as illustrated in this table. Brought by—

I.—*Police.* (*a*) Dangerous, chiefly so through an intention expressed, or otherwise, of committing suicide; or criminal, those who have actually committed, or appeared likely to commit, an indictable offence. (*b*)

Not dangerous or non-criminal, separately legislated for as—(1) Pauper; (2) Found wandering at large; (3) Not properly taken care of, or cruelly treated, or neglected.

II.—*Relatives or Friends.*

III.—*Gaol Warder.* (*a*) Prisoners of Crown who have become insane while undergoing sentence; (*b*) Accused persons unable to plead on account of insanity; (*c*) Accused persons acquitted on the ground of insanity.

South Australia, Tasmania, Western Australia provide asylums and hospitals only.

New South Wales, New Zealand, Queensland, Victoria provide in addition, hospitals for temporary reception.

New South Wales, Queensland, Victoria have also separate asylums and hospitals for criminal insane.

New South Wales, New Zealand, Queensland have licensed houses.

New Zealand, Victoria, boarding out.

Victoria, paying asylum and philanthropic asylum; licensed houses to be gradually abolished.

Medical and judicial powers to go hand in hand, the judicial order being given upon the medical testimony. This association is complete in New Zealand, where the Resident Magistrate has to order what are called private admissions in other colonies. The checks and safeguards to wrongful admission and detention are both numerous and efficient. In the vast majority of instances, all alleged lunatics are committed by two Justices on the certificate of two medical men. Exceptions occur, as in the case of paupers, where South Australia and Western Australia allow one Justice, and Tasmania two Justices, to commit on one medical certificate. The other exception is in the case of a dangerous or criminal lunatic who, in South Australia or Western Australia, can be committed with or without a medical certificate at all, if one is not readily obtainable, as may often happen in these sparsely populated colonies. The Justices can examine at private houses if they wish in most colonies; but New South Wales jealously guards against any abuse of this power by enacting a penalty up to £100 sterling if the Justices fail to report the fact of private examination.

Private admissions are in all cases obtained by an order or request from a relative or friend, supported by two medical certificates. New South Wales and Queensland require the signature to this request to be authenticated by a Justice or Minister of Religion, while New Zealand requires the person signing the order to make oath before the Resident Magistrate.

In all the colonies, persons may be found lunatic by inquisition or order of the Supreme Court, and committed to asylum. The methods of dealing with insane criminals are practically the same in all the colonies; but in Tasmania the Sheriff, as well as the two medical practitioners, must be satisfied as to the insanity before removal to an asylum can take place.

The question whether a person is sane or insane, has been rightly held here, as elsewhere, to be a medical one. It is a duty that has for generations past been thrust upon the profession, and like many another that falls to its lot, a most disagreeable one at best. Its discharge has caused

most respectable members to be more than suspected of heartless conspiracy and downright dishonesty. Laymen have not hesitated to set themselves up as superior judges to specially qualified medical men on the question, regardless of the fact that the possession of a medical qualification pre-supposes a more liberal education, and a still greater experience of human nature than falls to the lot of the average man. Much interesting food for reflection could be obtained by an observation of the different degrees of faith reposed in medical men in these matters by the different colonies, and to what extent they accept lay opinions as of weight in cases of insanity.

All require each alleged lunatic to be certified by two medical men, with the exception of South Australia and Western Australia, where, as I have already shown, one is sufficient in the case of paupers; even one may be done without if a lunatic is dangerous and a certificate not readily obtainable. Only in the case of a prisoner under sentence of death can I find any legal provision for more than two medical men inquiring into the insanity before committal to an asylum.

With the exception of New Zealand, which allows the examination to be made jointly in certain cases, the medical man must always examine separately from not only the one who has already given a certificate in the case, but any other.

The medical certificate must state facts, distinguishing between those indicated by the examinee, and those communicated by others. The only exception to this rule occurs in Victoria in cases that are brought before justices, when the certificate only contains an expression of opinion, without showing any grounds for it. This is a matter calling for remedy, as too great facility is thus given for perfunctory examination, which is further intensified by magistrates in busy courts only examining one medical man, and even then not requiring depositions to be taken. Hence the patient arrives at the asylum with little or no information to guide the medical officers, and a certain amount of colouring is given to the stories that are not wanting of a certificate of insanity having been given, when the wrong man has been examined. The medical man is paid also, not for his examination of the patient, but for his certificate of insanity. This can only be regarded as a menace to the liberty of the subject, and has been the reverse of satisfactory to conscientious men, who have found themselves unable to give the required certificate.

The examination must be made not more than seven clear days before admission in New Zealand, South Australia, Victoria, and Western Australia, while in Tasmania and Queensland this time is extended to ten and fourteen days respectively. In New South Wales, in private admissions, the time is ten days, but in police cases, twenty-eight days are allowed from the date of the last medical certificate. The restriction upon medical men, preventing them from signing for a particular patient for whom one certificate has already been obtained, extends from the simple prohibition of a "partner or assistant," as in South Australia, Tasmania, and Western Australia, to most elaborate restrictions in New South Wales. "Father, brother, and son," ought certainly to be added to "partner and assistant," as the mutual influence must be regarded as greater. Under the Victorian law, I have had to refuse certificates signed unwittingly by such relations.

When, owing to special inquiry, a patient has been admitted on one certificate only, the procedure to make lengthy detention legal, varies considerably. All New South Wales and Queensland require is one other certificate within fourteen days; Tasmania within fifteen days. The remaining colonies demand two more certificates within three clear days. If the urgency be distinctly proved, I think one additional certificate quite sufficient, as two would have sufficed in the first instance. In the great majority of cases the patients are in poor circumstances, often reduced thereto by the pre-existing lunacy that has not, or would not, be recognised as such.

The legal means provided, to justify the detention of the patient after his admission, are both numerous and efficient. They are exactly the same for lunatics admitted through the law courts as for those sent privately by their relatives or friends, although different methods exist in different colonies.

In New South Wales, New Zealand, Queensland, and Victoria, within seven days of admission the Medical Superintendent must forward to the State official head of his department a personal examination certificate as to the mental and bodily state of his patient.

In South Australia and Western Australia, if within forty-eight hours of the admission the Resident Medical Officer and the officer next in authority (probably a layman) are not both satisfied as to the insanity of the patient, a meeting of the Permanent Board of Inquiry must be held within three days to decide the question, and of this Board, the Government Medical Officer (the Colonial Surgeon) is Chairman.

Tasmania appears to consider that committal to her asylums is not to be lightly obtained. Having full confidence in her officers, she is not afraid of unnecessary detention, as the powers of discharge given to the official visitors, and the responsibility thrown upon the Medical Superintendent are, I think rightly, considered more than sufficient to prevent such. In marked contrast with this simple faith is the elaborate machinery of medical examination at the asylum, by outside men, provided by the latest Victorian Statute. Under this Act, the Superintendent is allowed to fortify his opinion of the sanity of a reception-house patient, before discharging him, by calling in another practitioner. If this man does not concur, another is called in as arbiter, and upon his decision rests the discharge of the patient, or his committal to asylum. Fortunately, the Superintendent has the choice of asylum to which the patient shall be sent, as the law might have placed him in a still more anomalous position, by calling upon him to treat as insane a patient whom he did not believe to be so. If the Superintendent considers the patient insane, he is compelled to call in two medical practitioners. If they agree with him, the patient is to be sent to asylum. If they agree with one another that the patient is sane, he is to be discharged; while if they differ in opinion, the services of a police magistrate and another medico are to be called into requisition to decide the question.

These provisions will, I venture to predict, occasion a great amount of unnecessary trouble, especially in recurrent maniacal and obscure delusional cases. This might have been saved by placing more reliance upon the Superintendent's opinion, which should carry more weight, if only from his opportunities of examination extended over from at least three to twenty-eight days. Whereas, the opinions that over-ride his

are formed upon one examination only, which may easily chance to take place during a lucid interval. It would have been too much to expect that that reluctance on the part of even intelligent laymen to consider insanity as the result of disease, and a special branch of medical science—a reluctance that is exhibited by even the learned judges of Great Britain—would have been so far eradicated by the transplanting of the majority of our legislators to Australia, as to induce them to frame laws, giving anything like full weight to the opinions of experienced alienists on questions of insanity. I think we must however congratulate ourselves in Victoria, that such prominence has been given to medical opinion in the new legal departure which, with the establishment of this section of the Congress, will I hope be the beginning of better things. The laws have pierced the asylums with means of inspection, that would more than suffice to demolish the abuses of fifty years ago. In many instances no distinction is made between licensed houses and asylums in this respect, oblivious of the fact that, in the one case patients are being kept for profit, while in the other, the officers can have no personal motive in detaining patients.

In New South Wales, New Zealand, Queensland, and Victoria, we have inspectors whose whole time is occupied with asylum matters, and who have able assistants in the Official Visitors, who are usually chosen from the medical or legal profession, or are members of the Legislature, or magistrates. In South Australia and Western Australia the same officers exist, but the inspectors have other duties to perform in addition. In Tasmania, the inspector's duties are performed by a Board of three official visitors. It is one of the duties of all these to see every patient in the asylum at each visit, to listen patiently to and inquire into all complaints, and to pay special attention to the newly admitted. They have the right of entry at all times; and in South Australia, it is specially enacted that any Justice has the same.

In South Australia and Western Australia, any two householders can obtain a meeting of the Board of Inquiry into the case, if they allege the sanity of patient has not been inquired into for three months. In the other colonies, any complaint addressed to the Inspector or Official Visitor, would cause full inquiry to be made into the special case.

Victoria has, in addition, just provided for the annual examination of all patients by specially appointed medical practitioners. This is I consider, a move in the right direction, as it altogether prevents the possibility of any patient being over looked, and is a duty that, with its attendant clerical work, could not have been discharged by the asylum medical staff in its undermanned condition.

The laws have fully provided for the discharge of patients on recovery, and the means of obtaining it are numerous. Admission to an asylum does not necessarily mean perpetual confinement therein. There is more uniformity in the method of discharge than of admission, and without much disarrangement of the sections of the various statutes, it would be easy to draft a law of discharge common to all the colonies. Discharge will be considered under three heads:—(1) Discharge by order of relative or friends. (2) Discharge by action of asylum authorities. (3) Discharge by order of Supreme Court.

(1) Discharge by Order of Relative or Friends.

In all but New Zealand and Queensland, the person who signed the request for admission, or his legal representative, may order the discharge of the patient, unless the medical officer certifies that he is dangerous or unfit to be removed, but the inspector or other superior authority has the power of over-riding this certificate. It is well that this method is little availed of, as its adoption would be constantly against the Superintendent's advice, and would lead to frequent relapses and other damage.

In New Zealand these dangers are guarded against by the proviso, that the person who signed the request must first obtain the consent of the Colonial Secretary, Inspector, or Medical Officer to the discharge, and then apply to the Resident Magistrate for a discharge warrant.

Removal by £50 bond, entered into with the Inspector, is a method in operation in New Zealand and Victoria, and perhaps in other colonies. It operates as a discharge from the asylum, but is altogether unsatisfactory in the event of subsequent recovery.

In New South Wales, the Inspector-General, as an official visitor, and in Queensland, the Minister, can allow friends to undertake the care of a patient, with the approval of the Superintendent or Medical Officer. Endeavours are made to lessen overcrowding, by making monetary allowances to indigent persons for so taking care of their relatives in these colonies.

(2) Discharge by Asylum Authorities.

The simplest method—almost the only one in use in Victoria, and adopted also in New South Wales, New Zealand, and Queensland—is for the Inspector, Official Visitor, or Superintendent simply to certify that the patient is detained "without sufficient cause." The issue of this elastically-phrased certificate to a superior authority, is followed by the discharge, except when a criminal is returned to gaol, or a Queen's pleasure man is detained until the pleasure is notified.

In South Australia, Tasmania, and Western Australia, any two visitors, with the advice of Resident Medical Officer, may order discharge, and this appears to be the regulation method.

South Australia and Western Australia have their laws further alike in that—

(1) Any three visitors may order the discharge, and in the case of a pauper, any two may do so.

(2) The Resident Medical Officer, or any two visitors, one being the Colonial Surgeon, may order the discharge of a patient committed as "dangerous or criminal," on receipt of certificates of sanity from two medical men. This provision can be set in motion apparently either by the asylum authorities, or relatives or friends.

In New South Wales and Queensland, the Inspector-General, or Official Visitor, has full discretionary power of discharge, whether recovered or not, after he has taken the advice of the Superintendent or Medical Officer.

In Queensland, the Minister can order the discharge upon the receipt of a statutory certificate from the Superintendent (or two medicos, if he be a layman), that the patient is "recovered and fit to be discharged."

In New Zealand, the certificates are worded (*a*) of unsound mind, or (*b*) in such a condition that can be liberated without danger to self or public, and no necessity exists for further confinement or detention. It will be seen, that the general principle underlying these proceedings is, that a medical certificate of suitability is followed by the discharge, as a natural consequence of the same authority having led to the admission. The opinions of intelligent laymen have expression in the voices of the official visitors.

In New South Wales, New Zealand, Queensland and Victoria, the Medical Attendant, Superintendent, or Keeper, can obtain a veto to a discharge proposed against his judgment, by tendering himself for examination by the Inspector or Official Visitor, and giving written reasons of objection to the political head of the department.

(3) Discharge by Order of the Supreme Court.

If the foregoing numerous methods fail to secure freedom, there is still the right of legal redress, by an appeal to the Supreme Court. This expensive method has very rarely been had recourse to; asylum physicians know full well, that so far from patients being unnecessarily detained, grave risks are constantly being incurred in granting what afterwards prove to be undoubted cases of premature discharge. Any-one specially interested in a patient can have the matter brought before the Supreme Court, which can sit in private, and any judge of which has absolute authority to order the discharge. The patient himself can set the machinery in motion in these democratic colonies, by a simple letter addressed to the Minister, which must be forwarded unopened. The Supreme Court also has the sole authority to order the discharge of any person whom it has found lunatic by inquisition.

After a survey of the different methods of discharge, it will be recognised that complete provision is made, and that a patient's exit from an asylum, when the public safely permits, is quite as easily obtained as even his voluntary admission into it.

I will conclude, Mr. President and Gentlemen, by saying that, although many debateable subjects are raised, the ground travelled over is too extensive to permit of the whole paper being the subject of profitable discussion. The issues are too numerous for any practical good to result at present; but I will hope, that the result of my labours in collating this information from the various statutes, will be found useful in the preparation of papers upon some of its points for future meetings of the Congress. The comparisons instituted will also, I trust, serve to make us better acquainted with the laws under which our neighbours have to act in their dealings with the insane. What we already know, but what the general public is remarkably slow to believe, is also I think clearly demonstrated, that admission to an asylum is hedged about with such precautions, the probability of wrongful detention is so carefully guarded against, and discharge on mental recovery is rendered so easy, that it is practically out of the question that sane persons can be immured in our lunatic asylums.

The Members thanked Dr. Armstrong for his paper, and a strong expression of opinion was given by all members against that portion of the further Amended Lunacy Act of Victoria, which provides for the

inspection of asylums once a year by an outside medical man. It was thought that the asylum officials were the best judges as to the sanity of the patients, and that the Act throughout threw discredit on them in a manner that was highly undesirable. Private asylums were considered unnecessary, except for very wealthy people.

Dr. ARMSTRONG in replying, stated that though he considered it was practically out of the question that sane persons could be immured in our asylums, he nevertheless defended the appointment of an outside examiner, as an additional safeguard.

THE TRAINING OF NURSES AND ATTENDANTS IN HOSPITALS FOR THE INSANE.

By W. C. WILLIAMSON, M.D.

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The question of establishing some system of training for nurses and attendants engaged in the care of the insane in our asylums, has been, in recent years, one of very great interest. The subject is an old one revived. Many years ago, close on half a century, the need of reform in the class, character, and education of persons entrusted with this responsibility was recognised. Curiously enough, though our co-workers in general hospitals have made trained nurses what they are, the honour of leadership in the ideas of nursing reform belongs especially to Drs. Jacobi and Pinel, two alienists whose names will be for ever held sacred as early pioneers in the humane treatment of the insane.

There has always been a difficulty in obtaining nurses of the right kind for service in our hospitals for the insane. Samuel Tuke, in 1841, describing the trying and arduous character of the work of caring for the insane, writes:—"Can it be surprising if it be so difficult to meet with persons to fill properly the post of attendant on the insane, that instances of neglect or abuse so frequently occur?"

Dr. Kirkbride, about the same time, in the United States, was commenting on the same trouble, and thus defines his conception of an ideal nurse:—"A person of high moral character, of good education, strictly temperate, kind and respectful in manners, cheerful and forbearing in temper, with calmness under every irritation, industrious, zealous and watchful in the discharge of duty, and above all sympathetic with those under care. No wonder," he added, "The services of such an individual, after proper instruction in the performance of duty, would be invaluable." Nurses of this stamp, however, were not to be had, and I do not think there could have been much at this period to choose between the hospital and the asylum pattern.

No change in either service took place till Florence Nightingale began her noble work in the Crimea. Her efforts to ameliorate the sufferings of our soldiers wounded in that campaign, and her organisation and management of the nursing in the camp hospitals laid the foundation

for her future labours on her return to England. To her, the entire world owes a permanent debt of gratitude for the reforms of modern nursing.

Coincident with Miss Nightingale's labours in the Crimea, we find Dr. W. A. F. Browne delivering at the Crichton Institution in 1854, thirty lectures to his asylum staff, with the express object of elevating the standard of nursing efficiency. Dr. Mackintosh at Gartnavel, made somewhat later an effort in the same direction, and gave instructions to his attendants, taught them to take notes, and observe physical alteration in patients, &c.

These efforts were unattended with the success they deserved, and the movement lapsed. Then, as years went by, and the marked success of the reform in general nursing was noted, and while superintendents were bewailing the scarcity of suitable asylum nurses, there became apparent the possibility of educating the mental nurse on the same lines as her sister trained for bodily nursing.

Dr. Clouston, of Morningside, in a paper read by him in 1876 before the Medico-Psychological Association, on the question of "Getting, Training, and Retaining the Services of Good Asylum Attendants," pointed out that there were at the end of 1875 in Great Britain about 72,000 insane persons, for whose care and treatment some 6000 nurses and attendants were necessary. He stated the raw material of the right kind out of which they endeavoured to make good attendants was, and had been, most difficult to obtain, and he showed how unsatisfactory this condition of things was. It made matters hard for the proper management of asylums, was detrimental to the insane, interfering with the comfort and happiness of some of them, prolonging the malady of others, preventing the recovery of a number, and causing risk to the lives of not a few. He described, in fact, this attendants question as the one causing most anxiety to many at the head of asylums.

To obviate to some extent the difficulty of developing his raw material into satisfactory shape, he had found the early placing of his probationers in small classes in the sick wards under a careful and competent senior, to be a step in the right direction. In this way probationers came into contact with the sick in mind and body, learned the individual wants of the insane, became impressed with the fact that they were really patients, got into good habits and right ways of thinking generally, and proved to be far better qualified for the more regular work of ward routine.

The basis of action here was evidently to impart at the outset some knowledge of bodily nursing, at the same time bringing those cases of insanity in which more than ordinary care and attention were required, more prominently under the observation of the young attendant. Dr. Clouston foresaw the marked influence which the first few months of asylum life have upon the future of the probationer, and he rightly determined to make the best use of his opportunities. No systematic teaching had up to this time been attempted, but the rapidly advancing importance and benefit of trained nurses in general hospitals and elsewhere, gave further impetus to the proposals and practice of the distinguished Superintendent of Morningside.

Dr. Campbell Clark, of the Glasgow District Asylum, Bothwell, began in 1881 (not without distrust of the results), a course of eighteen

lectures to his staff, the subject matter thereof being apparently practical mental nursing, put into as simple form as possible. The success of this departure was so marked that he ventured on a second course of lectures, and again the result was most gratifying. The latter series embraced a wider field of teaching, and prizes and certificates were eagerly competed for at the examinations on the conclusion of the course.

In Dr. Campbell Clark's paper, read before the Medico-Psychological Association in 1883, he stated as the result of his somewhat varied experience :—"(1) That too great a barrier existed between officers and attendants ; (2) That the mental and moral qualities of attendants were not utilised as fully as they might be, and (3) That attendants require to be individualised as well as patients." In working out his scheme, Dr. Clark put on record his opinion that, "We are becoming more and more fully impressed with the idea, that the asylum of the future will partake largely of the hospital type."

In America, the necessity of reform in the nursing of their insane, had also been recognised, and for some years had occupied the minds of asylum superintendents. In 1879, the plan of the McLean Asylum Training School was definitely determined upon. "The object was to create a school, not simply for the instruction of attendants on the insane, but to fit young women, as in the general hospitals, to undertake nursing in all its branches, wish special qualifications for the care of cases of nervous and mental disease." I have no hesitation in expressing my belief that the work done there by Dr. Cowles, as fully set forth in the paper on "Nursing Reform for the Insane,' read by him in September 1887, before the Psychological Section of the International Congress at Washington, embodies the most important advance in our modern methods of caring for the insane. Dr. Cowles had not, up to the time of writing his paper, extended his system of training to his male attendants, but the success of the movement among his nurses was such as to leave no doubt in the reader's mind he intended shortly to include his men in the scheme of nursing reform.

In February 1884, a sub-committee of the British Medico-Psychological Association prepared an official handbook for the special instruction of attendants, and since then a considerable amount of literature has been published on the same subject.

I am glad to say that reform in this direction has not been confined to the few asylums already mentioned. In our own colony, Dr. Sinclair has, at Gladesville, for the past two winters carried out complete courses of lectures and ward training, both for nurses and attendants, and I shall have much pleasure later on in giving an outline of the system practised there with very great success.

The practicability of establishing with success a regular system of training being now assured, the development and extension of the scheme can only be a matter of time. In reviewing the present position of trained nursing in general hospitals, we are at once struck with the enormous advance it has made within the generation of its existence, and that, not alone in the marked efficiency of its service, but—another excellent test—in the appreciation with which it is held by the public. The employment of trained nurses may now be said to be universal. We have nursing departments for the army and navy existing in our large military and naval hospitals in England, and we find that in time

of war these nurses are sent out for service in the hospitals which receive the wounded from the field of battle. In all civilised countries, there are to be found training schools attached to the larger and more important hospitals, where nurses are carefully prepared for their future mission. In public and in private, none but trained nurses are employed, and we shall probably find ere long many of these qualifying themselves specially--on the same principle as do our professional brethren—for attendance on special varieties of bodily illness.

In New South Wales, Sir Henry Parkes long since recognised the wisdom of having a similar system to that established at St. Thomas', in London, under the supervision of Miss Nightingale, and some twenty years ago, acting on the recommendation of Sir Alfred Roberts, then one of the Surgeons to the Sydney Infirmary, obtained the services of several trained nurses from England, as a nucleus from which nursing reform might be extended in the mother colony. We now find appointments on the nursing staff of our hospitals the object of keen competition, and the list of applicants for training always much larger than can be accommodated. Trained nursing, in short, has now been elevated into a profession. It enlists the best sympathies of mankind, affords a large field of noble usefulness, and provides a valuable and self-supporting occupation.

When we turn from this view of nursing, as it exists for bodily illness, to the present condition of nursing for the insane, we naturally say to ourselves, "If the nurse of one sick of a physical disease is so much improved by training, how infinitely more important is it that those who are to minister to a mind diseased should have a special teaching?" I am inclined to think that in the past the medical officers have put too much faith in the means which they personally brought to bear upon the recovery of their patients, and have overlooked, or not made sufficient out of the association of the nurse or attendant with the patient. We recognise how great is the influence of surroundings upon the insane. We improve their accommodation, brighten their rooms, give them amusements and occupation in variety, but we have not yet made for them ideal nurses. If we omit to train the nurse to understand the patient, there exists a barrier between the two, caused by indifference, ignorance, and lack of sympathy on the one hand, and distrust, perhaps fear, on the other.

If, as there is little reason to doubt, success in the treatment of our insane depends largely on the men and women to whom we confide the trust of our patients, and the fulfilment of our instructions, the necessity of providing the best possible type of nurse and attendant, and of training them thoroughly for their important duties, is evident.

In too many instances the system hitherto has been to allow the raw material to develop of itself, without assistance or instruction worthy of the name from the medical officers. A copy of rules, a few hints from matron or chief attendant, and the new comer enters upon his work. Nurses and attendants some time in the service of the institution are not found to bother themselves about new hands, and if there be any training or example shown them, it cannot, I fear, always be said to be what is desirable. Almost invariably a lazy, indifferent senior will spoil the juniors in the same ward by force of example, and the first six or twelve months may well be said to make or mar the future of the

probationer. The difference between a trained nursing staff and one allowed to develop of itself, is just the difference between skilled and unskilled labour.

Acceptable applicants for the posts of nurse or attendant must have had a fair general education. They are usually under the age of 25 years. They have had, in the large majority of instances, no previous knowledge of nursing or experience of the insane. The appointments sought for are permanent (dependent on good behaviour). This is, in itself, a considerable attraction. The rates of pay are good, and promotion to senior grades follows on efficiency and length of service. With us in New South Wales—for all who elect to participate in the advantages of the Civil Service Act—pensions are attainable when unfit for further work through age or ill health. Yet, despite these inducements to enter the asylum service, we have, from time to time, actual difficulty in filling vacancies on the nursing staff with material of the right kind. The reasons seem obvious. There must be—as compared with ordinary nursing—a want of interest in their patients, inasmuch as in hospitals there is a rapid change of cases, with visible and speedy improvement in many instances to which nurses can personally contribute. Whereas, in asylums, interest and zeal are apt to flag under the prolonged character of the disease; when there is but little, if any, change from day to day; when convalesence is slow, and when patience and nursing are not quickly rewarded by results, the work is frequently unpleasant, and there has been no attempt made, till very recently, to develop the sentiments which should animate nurses. They have been left too much to their own devices, have had but little interest taken in them by their superior officers, and, so long as they filled their position without unfavourable notice, all went well.

The occupation, however, is a healthy one, and entails an out-door life. Its monotony is relieved by frequent holidays, by varied amusements in which both patients and nurses participate, and by having the evenings off duty. Still, there is no doubt, while the asylum nurse is much better paid, the general hospital attracts to its service applicants of better social standing and education, and is becoming increasingly popular; while the asylums seem, in this respect, at a standstill, and our nurses continue to be nurses by name, rather than by virtue of their special knowledge. To remedy this condition of things, to improve our nursing system, to render our service more popular, and to attract thereto better material, I would earnestly advocate a systematic course of training.

If our nurses and attendants are not taught how to do their work, what can we hope from them? Surely, even as we expect good work from them, may they fairly and rightly look for help and instruction in their duties from us. Wherever this plan of nursing reform has been carried out, the result has far exceeded the expectations. A new interest has been awakened for nurses in their work; a spirit of healthy emulation excited; medical officers have readily testified to the remarkable improvement in the general efficiency of their staff; patients have been better—infinitely better—looked after, and the tone of the hospital has been sensibly improved. Officers by this means are brought into more immediate contact with nurses and attendants, and thus get abundant opportunities of ascertaining their individual characters,

dispositions, and temperaments. A feeling of community of interest, of unity of purpose, of mutual regard, springs up. Incapacity, indifference or neglect meet the fate they deserve; and the elimination of those unfitted for their trust, tends to strengthen the staff as a body. Special aptitude and intelligence are soon discovered; defects of primary education are removed by the ordinary exercises; encouragement is given to all, and none are over-looked. Discipline is also promoted, *esprit de corps* becomes a reality, evil habits are held in check, and self-respect is more marked. Such knowledge of real nursing once obtained, is of immense advantage in after life, when perhaps connection with the hospital may be severed, and some other occupation entered upon. For the nurse, her certificate of training assures a future independency, as it qualifies her to obtain her livelihood, either in undertaking the charge of a mental case, or of some patient suffering from bodily illness. Wherever her future life may be spent, her knowledge of nursing will prove a priceless boon to herself as well as those around her.

The value of men as nurses for members of their own sex, has lately been commented on by Surgeon-General Longmore, C.B., and with them, as with women, such knowledge of nursing must be always an advantage to themselves personally, as well as to those who, from any cause, need their services. In support of this, I would point out the present state of organisation and efficiency of the Army hospital corps in England; their constant presence in all military centres at home and abroad, and the very valuable character of the services they render to the sick or wounded.

Again, at the Royal Naval Hospital, Haslar, near Portsmouth, there is a very perfect system of training and teaching for duty, both afloat and ashore. Boys are selected immediately on entering the service, and before they have been to sea they are sent to the hospital at Haslar, where they receive three years' tuition in the wards, and a thoroughly practical training under strict discipline. They thus become qualified for their duties as sick berth attendants in Her Majesty's ships; and after they return from sea, are again remitted to Haslar for further tuition, so as to keep them up to the mark.

Trained male nurses are also largely employed for attendance on patients in private practice, as well as in public institutions in the old country, and with satisfactory results. It would thus appear that men are quite as capable of becoming good nurses, as the gentler sex.

To come to the actual teaching, I cannot do better than quote Dr. Cole's final advice to those who would follow in his footsteps :—"Get ready before beginning, begin rightly, go slowly, do the work thoroughly, and there will surely be good results." The best plan seems to begin with the nurses, and as soon as they are on an established basis, extend the system to the men. Women have more of the nursing instinct in them; they are on the whole more sympathetic and gentle, and seem to take almost naturally to tending the sick. Florence Nightingale struck the right chord in basing her nursing reform upon that most potent quality of human nature, its motherliness.

Instruction should be by lectures, ward teaching, and demonstrations. The course should extend over two, or perhaps preferably three Sessions, the winter being naturally the best time for work. The first Session being devoted to bodily nursing, the second and more advanced to the special nursing of the insane, and where more instruction is thought

desirable, it might take the form of residence and tuition in some general hospital, where a more intimate practical acquaintance might be had with bodily diseases, accidents, operation cases, and such like. It must not be forgotten that the amount of ordinary physical illness in our asylums is not sufficient of itself to afford an ample experience to a large staff of nurses and attendants, and it is for this reason I would—where the arrangement could be effected—recommend the adoption of a scheme, whereby our asylum nurses might, after being well grounded in all the practical work the asylum is capable of, be sent, a few at a time, to assist in ordinary ward duty in a hospital devoted to general diseases. In New South Wales, where there is a Government institution of this kind (the Coast Hospital, Little Bay), some such arrangement might be made with, I believe, very great advantage.

There will doubtless be some diversity of opinion among medical officers, as to the detailed working of any scheme of nursing reform; what might answer well in one place, might not suit in another.

The system adopted with success at Gladesville, began in the winter of 1887 with the nurses, and was a year later extended to the attendants. The object has been to teach the staff how to nurse the patients, without taking on themselves any authority in the matter of treatment. Up to the present, the nurses and attendants have been in separate classes, but later on, when the majority have been taught, it is proposed to have combined classes for facility of teaching. The subject of these earlier (or first year) lectures, are medical and surgical nursing, with very elementary anatomy and physiology. The work commenced by one of the medical officers delivering lectures bi-weekly. A suitable day and hour (usually Thursday afternoon of each week) were set apart, and the nurses divided into two classes, so as not to interfere with ward routine. The subject matter of the lectures was couched in the simplest language, was illustrated by diagrams and plates, by the skeleton, or other means which suggested themselves; the blackboard was also an assistance. The lecture occupied about one hour. The second class of nurses received the same instruction on the following day. Then on each Saturday, while the course of lectures lasted, the medical officers spent part of the afternoon in the wards, holding a kind of tutorial class, explaining any points of doubt or difficulty, and ascertaining how each nurse individually grasped the subject of the previous lecture. At such times, he demonstrated the use of the thermometer, taught them how to apply bandages, and for himself gained many hints as to the best means of conveying knowledge. Being thus brought into actual contact with the nurses, he made sure one lecture was understood, before another was delivered.

Then, on the completion of the course of lectures, a few tutorial classes were held on the subject of the lectures throughout. Examinations (oral and written) were subsequently held by outside practitioners, and the result communicated to the nurses. Those who fail to reach a fair standard of efficiency are referred back for more study, but so far these have been quite exceptional.

In addition to the subjects already mentioned as belonging to the first year's course, I think some elementary knowledge of hygiene, so far as it relates to air, water, disposal of nightsoil, might be added with advantage. It would also be well, now that the use of the gas-stove is

so much more general, to have some practical lessons on cookery, as required in sick nursing. The second year's lectures at Gladesville have been in connection with mental nursing proper. They have dealt with the elementary anatomy and physiology of the brain, with the operations of the mind, will, &c., and with the subject generally of insanity. Practical illustrations were made of patients in the wards in connection with each lecture, and an examination followed as before, with the difference that, on this occasion, one of the examiners at least must be a medical officer attached to the hospital itself.

Subsequent to this second examination there is a third, which embraces the whole course of lectures—of the first as well as the second year—and on the passing of this, together with a satisfactory record of ward work and general treatment of patients, nurses obtain their certificate.

So much for the practice of Gladesville. That it is fruitful of results, I can well testify. In 1882, I was the acting medical superintendent of that institution. We had no teaching then, and the quality of the nursing did not always recommend itself. In 1887, I examined the nurses on the conclusion of the first course of lectures. Without hesitation I affirm, that they would have well compared with any body of nurses who had received a similar course of training in a general hospital. Their accuracy of knowledge, zeal, and evident wish to learn was as creditable to themselves as to the medical officers who had taught them. I have gone somewhat fully into this training of nurses and attendants at Gladesville, as I believe the system there adopted to be both thorough and judicious.

The whole subject, Gentlemen, is one of absorbing interest, and is, I believe, but in its infancy. There can be little doubt of its growth and extension. I believe the old order of things will soon give way, and that a few years hence will witness in each asylum for the treatment of the insane in Australia, the establishment of a regular system of training both for nurses and attendants. I know of no one subject in our special branch of medicine fraught with more important issues to the welfare of our patients, or which bears more closely on our own actual success in ward work. I do not, for one moment, think we can at present estimate the far-reaching influences arising therefrom, and I believe that new possibilities of all kinds will open out under the influence of such a staff, as we may reasonably hope to obtain when nursing is taught in our asylums as fully and completely as in other hospitals.

I trust, Gentlemen, at our next Congress we may have recorded the experiences of the medical officers of other colonies, and that their success will be quite equal to that reported elsewhere.

The members thanked Dr. Williamson for his valuable paper, and all were agreed that instruction of the attendant and nurse was the thing, at the present time, in the further advancement of the curative agencies brought to bear on the insane, and ought to be carried out zealously, as part of the medical officers' duties.

Dr. Manning spoke most hopefully of the results of the lectures given during the last two years at Gladesville, New South Wales.

Dr. FISHBOURNE remarked that Victoria was the only colony where medical superintendents had not the engaging and dismissing of their attendants and nurses—a state of things which militated against proper discipline and attention to duties, and would certainly come in the way of a system of instruction being fully carried out.

THE EXTENSION OF HOSPITAL METHODS TO ASYLUM PRACTICE.

By ERIC SINCLAIR, M.D.

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The following paper would perhaps have been better named "The Further Extension of Hospital Methods to Asylum Practice." It is not intended to presume that hospitals for the insane are far behind general hospitals in their methods of practice, if indeed they are behind at all; what is proposed is, to advocate that some of the modes of nursing in vogue in general hospitals, might with advantage be adopted in hospitals for the insane.

Each year, those who have to do with the insane become more convinced, that the asylum of the future should be a hospital, with powers of detention; that the insane patient should be treated altogether as a sick person; and that the main idea of the hospital for insane should be medical treatment of disease, not mere detention and separation from society.

It is mainly such hospital methods as will assist in improving nursing, and the nursing staff, that the present remarks are intended to advocate. Not that I do not believe that many other hospital methods, not mentioned here, may be introduced with advantage.

All who have to do with asylums have experienced that nurses and attendants have improved much in past years, and that they are still improving yearly, both in education and social position. A better class are now applying for appointment, and in larger numbers, allowing us greater scope for selection. Improved asylum methods give them a better position and a clearer idea of what their work is; they consequently, devote more time to the care of individual patients, and less to mere guarding. The modern system of trusting patients, in work and exercise, is a direct outcome of this improved staff. Most of the advances in the past have been obtained by making hospitals for the insane less of the asylum or refuge, and more of the hospital for cure. The hospital for the insane is not primarily intended for retaining chronic and incurable patients, so much as to prevent acute cases from becoming chronic.

And now, the need for improved nursing arrangements being recognised, it is evident that the nursing staff must first have some more or less systematic training, to allow of their being able to carry out intelligently, ideas as to improved nursing. A course of lectures,

demonstrations, and examinations, will do much to give this; but, unless supplemented by special training in a ward, moulded more after the style of a general hospital than most hospitals for the insane at present possess, it will not make the staff sufficiently good to effect a radical change in the nursing of the patients. I do not for a moment intend to have it understood, that training of nurses cannot be carried out without such a ward, or that the training when completed, will not be of value in its absence; but I do think, that the possession of such a ward will allow of the training being carried to a pitch of perfection, impossible without it.

What form the ward should take, will depend so much on the circumstances of the asylum it is to be attached to, that much time need not be taken up in describing an ideal one. The following may, however, be taken as a general outline of one that would fulfil all necessary conditions:—It should be large enough to contain forty or fifty patients, and be separate from the main hospital; not necessarily on a separate site, but distinct enough to avoid having patients from other wards coming in, or being sent in at night to utilise vacant beds. The proportion of single rooms to associated dormitories a large one, not less than one to five, preferably one to four. Some at least, of the single rooms must open from the day-room, or be so near as to allow of the attendants hearing what is going on in them, and also to make it easy for them to be visited every few minutes. The associated dormitories may either be a series of small ones, containing three or four, to ten or twelve beds each, or be one large one of sixteen or twenty beds, with partitions four feet high between the beds. In this way, privacy and comfort may be secured with efficient supervision. The day-rooms to be light and cheerful, to have large windows with bays and as extensive and beautiful an outlook as circumstances permit. There should be, if possible, two day rooms—one to be used by excited patients, the other by depressed and sick. These day-rooms should be contiguous, communicating with each other by a door or passage, so that as a rule both classes of patients mix. Separation is only necessary when very noisy or destructive patients are in hospital.

In this sick hospital and hospital ward, the patients should be looked on as sick in body, kept in bed when required, and otherwise treated as they would be in a general hospital. When they had improved or recovered so as to benefit by the change, they would be sent to another ward, and into the working parties. All new admissions should be sent here, as well as all cases of sickness occurring among the ordinary patients. Thus attendants or nurses would have an opportunity of seeing all kinds of illness, bodily as well as mental.

The main use of this ward would be, as already indicated, the training of the staff. There should always be a large number of nurses or attendants here, partly to allow of special modes of treatment requiring extra assistance being carried out, and partly to let as large a proportion of attendants as possible benefit by the training.

On first joining the hospital, all probationers without exception, would be sent here, and each would remain till he or she had become a nurse, and had had hospital methods thoroughly drilled into him. It would be advantageous to have the new comer remain in this ward during the whole two years of training; but this is not absolutely

necessary. From three to six months at least must be spent here, before he is allowed to enter the ordinary wards; and if the service can allow of it, he should have attended the first year's course of instruction—that on ordinary nursing—and have passed an examination on it satisfactorily. It should also be arranged, that attendants return to this ward during the lectures on mental nursing in their second year's course. If the staff is so small as to require it, the series of lectures and demonstrations could be given at different periods of the year, so that new attendants could receive their elementary instruction, and be sent into the different wards, and their place be taken by second year students.

A further extension of hospital methods, that might with advantage be made, is the training of nurses and attendants for private work. In America, it has been found possible to institute a training school for attendants on the insane, apart from the asylum staff, and we should be able to do the same in such a ward. There need not be much difficulty in procuring both nurses and attendants at a lower rate of pay than is at present given, if it is understood that, on their passing examinations, and showing proficiency in the wards at the end of two years, a certificate will be given. In this way a larger junior staff might be employed, without materially increasing expenditure. These certificates would be of value in procuring employment as private nurses for insane patients. There is not yet any large demand for these nurses in private practice; but undoubtedly, if thoroughly efficient nurses and attendants were to be had, they would find employment. This has been the experience in America and England.

Of course, the best of the trained nurses might be taken on to fill vacancies in the hospital staff, and by thus giving a larger number to select from, the standard of efficiency would be materially raised.

All that has just been said may be called practical, in that it is possible to have it carried out—without any great or expensive alteration of staff or buildings—in hospitals for the insane as at present constituted in Australia. If a special ward cannot be built, it may be possible to alter one of the ordinary wards to suit the purpose. If even this cannot be done, the school might be begun in the present wards, making such minor alterations as would adapt them to the purpose.

But there is still a higher point to be aimed at, and this may, perhaps, be called ideal. To me, it seems not to be so. I mean the adoption of another hospital method—in the separation of the nursing from the cleaning, housemaid, and labouring work. In general hospitals this step was found to be necessary, to induce well-educated and gently-nurtured women to become nurses, and to retain them. And, in our as yet small experience in training, the want of this is found to be a great hindrance.

The objections to this separation are great, but not insuperable. It is already partially carried out in most hospitals for the insane. The laundresses, cooks, and needlewomen are not usually nurses. On the male side, the artisans, engineers, gardeners, &c., though they have complete charge and care of patients during working hours, have usually had no nursing experience or ward training. Why should it not be possible to have a part of the female staff—paid at a lower rate—to do the mere cleaning work, with the assistance of patients, and of course

under the superintendence of the trained nurse in charge of the ward? They would be available to help in watching the patients, and thus an increase in the number of the staff need not be necessary. And on the male side, why should not the arrangement at present in force with the artisans be extended to all the out-door staff? The more perfect the classification, the more feasible it would be to adopt such a system. In a hospital with large wards of 80 to 100 patients in each, it would not be easy to individualise the patients well enough to allow of the smaller purely nursing staff looking after them efficiently. But in one with smaller and more numerous wards, classification may easily be perfect enough for one trained attendant to know each of his patients thoroughly, and not neglect any of them.

Until some such system is adopted, it is difficult to see how we are to induce people from a higher station in life than that from which the majority of our staff is at present drawn, to join the ranks of nurses and attendants.

THE HOUSING OF THE INSANE IN VICTORIA, WITH SPECIAL RELATION TO THE BOARDING-OUT SYSTEM OF TREATMENT.

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The housing of the insane is a subject of so constant importance to asylum physicians, and the authorities who charge themselves with the providing of such, that I feel sure nothing in the way of introduction is necessary on my part, before launching into what is a troubled sea.

I would court discussion to the fullest extent, with the hope of arriving at some general understanding amongst us as to the best means to be adopted for the housing of the various classes of patients with whom, as mental physicians, we have to deal, and in whose interests, as managers of insane hospitals, our voices should be heard. That we shall establish some sound basis is all we can hope for, seeing that the question is as vast as the ever-increasing numbers for whom accommodation has to be provided.

First then, let us study the existing methods adopted in England, Wales, and Scotland, before coming to Victoria, where extension of accommodation is particularly rampant just now. I am not going to enter into statistical figures, as it would only be wearisome. I shall content myself with asking you to allow me to generalise only, the more especially as in England, Wales, and Scotland, the various names given to the insane hospitals, according to their method of government, precludes exactness in figures, when compared with colonial institutions.

In England and Wales, the gross bulk of the patients, according to Dr. Hack Tuke, to the extent of about 70 per cent., are in the public asylums; the private asylums take up 5 per cent., while about 8 per cent. are in private dwellings, and the balance in workhouses, which in some instances have lunacy wards. Taking the private patients separately, rather more than half reside in public asylums, a small percentage are single patients in private dwellings, and the balance, about 30 per cent., are in licensed houses.

In Scotland, nearly 60 per cent. are in public asylums, only about 2 per cent. in licensed houses, 20 per cent. in workhouses, and about the same number cared for in private dwellings under official inspection; thus it will be seen that the Scotch have adopted to a large extent the system of supervision of insane persons in private dwellings, and that they make scant use of licensed houses. If we again take private patients by themselves, we find that more than three-fourths are in public institutions, and a very small percentage in licensed houses and private dwellings.

In America, Dr. Hack Tuke tells us "the tendency is in favour of proprietary asylums," while "in Britain the current feeling flows in the direction of the larger appropriation of the public asylums to the wealthier classes."

In Victoria, indeed in Australia, the insane at present are broadly looked upon as wards of the State, and housed by the various governments almost regardless of social distinction, the friends of each patient paying as much as they can be got to.

What then ought we to decide are the necessary requirements to be striven for in the interest of our insane population? My own views are, that as no licensed houses exist, none should be authorised; that public institutions should alone be recognised, and that they should have proper reception wards in the shape of an acute hospital, with all the necessary appliances for observation and treatment, where new patients may be apart from chronic, or at all events, advanced cases; that these public hospitals should each be so arranged as to admit of providing for the treatment of patients of different classes, whether socially or mentally, and that segregation be the point to be arrived at. Those patients serving sentence, and committed from gaols, as well as Queen's pleasure cases, should be treated in an establishment by themselves, and it is a question whether the penal departments ought not to look after those serving sentences themselves, as from their very nature they are uncertain and disturbing elements in hospitals for the insane.

As my main object in this paper is the dealing with the treatment of the insane in private dwellings, it will be necessary to at once say that the principle of segregation, though good on the whole, has run riot in the amateur psychological mind, and it shall be my business to set forth the special circumstances under which the housing of the insane is most calculated to be of advantage in this colony, which really means how best to deal with the chronic harmless insane in such a manner as to hamper as little as possible the active treatment of cases in their earlier stages. First of all then, let us dispose of those cases of necessity requiring hospital care and treatment, by stating that each district institution—for I would divide the colony into districts—should have its reception wards for observation and treatment, its convalescent wards

or cottages, its wards for chronic cases and epileptics requiring skilled supervision, and some accommodation for the chronic harmless patients, pending further arrangement.

In Scotland, the treatment of the insane in private dwellings has been legislated for very fully, and the machinery is ready made in the shape of existing parochial authorities, both medical and lay; the main object of the system being the relieving of the county asylums of the over-crowding caused by the accumulation of the chronic harmless insane of the pauper classes, by the dispersion of such as do not require "institutional control" amongst cottagers willing to accept the care of them.

This subject was dealt with some twenty-five years ago by Sir Arthur Mitchell, one of the Scotch commissioners, and has been receiving attention ever since, with the result that some twenty-two per cent. of the registered pauper insane are now in private dwellings, where special attention is given to the fact that the General Board of Lunacy discountenances all efforts to form aggregations of lunatics or so-called colonies, like Gheel; and that while recognising the benefits to be derived by patients in asylums, strongly urges that family treatment outside of institutions is proper in a considerable number of cases, which must be under the control and careful supervision of some public central authority.

As all insanities have a tendency towards dementia, or that mental enfeeblement which comes to all of us with advancing years, it would appear that we have a large field for selection of those cases supposed suitable for boarding out; perhaps half of all "those remaining at the end of the year" coming under this statistical heading, and not only remaining so at the end of the year, but actually being so on admission to our asylums, and yet how difficult to make a selection of the patients and the domestic care which may be suitable. It must always be remembered, that in a colony like ours there are many difficulties in the way of adopting a plan like this, where cost, suitable guardianship, and a system of constant supervision are the three elements in its formation.

First, then, let us look at the cost. Are we in Victoria likely to get anyone to undertake the care of a lunatic, and maintain him as a member of his own family, under the strict supervision of some central authority, for the small sum of say twelve shillings a week, which is the asylum rate of maintenance? Next, have we the class of cottagers, in easily accessible districts, who would be suitable guardians? And lastly, have we that means of supervision which is so necessary? To all of these we would be apt to answer No, and neither are we likely to have, except at a most exorbitant cost, at a risk that guardianship might take to farming a patient as merchandise, without further regard, and at the expense of supervision which must be newly created. The requirements are such that it would be difficult to find guardians prepared to give efficient and kindly control; yet we ought not to magnify these difficulties, as, if once we started in earnest, they might be more apparent than real, as was found to be the case in Scotland.

It would be well here to consider the classes of patients apparently suitable for treatment in private dwellings; and they are fairly numerous in our institutions, and comprise such as may have come from foreign countries, those who have outlived their relations, or been long since lost sight of—even deliberately deserted and shunned, from apprehen-

sions lest responsibility of maintenance be incurred, or from reluctance that their acquaintanceship with an inmate of a lunatic asylum should become known.

Granting then that we have a large percentage of the so-called chronic harmless insane, the points to be sought for in the guardians are that—(*a*) Relatives are to be guardians where possible and suitable; (*b*) the religion of the guardian to be the same as that of the patient; (*c*) strangers, when guardians, to be of the same social level as, certainly not a lower level than, the patient, who is to be treated as a member of the family, and employed as such; and (*d*) that all guardians must submit to constant supervision of their houses by a central authority, whose business it will be to see that these houses are moderately attractive, and not in sparsely populated districts; also to carefully supervise the arrangements for the boarding of young females; to note the possibility of an insufficient food-supply; to see that all are bedded properly, and not unduly worked for profit, or looked upon merely as paying objects. As regards the cost where relatives are guardians, we need only defray the actual amount of maintenance; but when aliens are employed, something in addition, as an inducement, must be offered, subject always to the proviso, that in no case ought the cost to be greater than that of asylum maintenance. If, then, we in Victoria are to adopt this plan, we must start cautiously and on a small scale, by asking each medical superintendent at first to arrange himself for his own patients on certain broad lines, reporting at once to the Inspector of Asylums, then to visit and report quarterly on each patient, the inspector also visiting when in the district. As the cases would be in the immediate district of each superintendent, I do not think that for some time the supervision so arranged would be too heavy a duty; but as cases increased, and the system became more general, some one, such as a deputy commissioner, might be appointed to assist generally in the inspection of our asylums, but have this duty as a special one.

It might, perhaps, be thought that this treatment in private dwellings might kill our present useful system of letting patients out on trial with their friends; but I think a statutory declaration as to ability to pay, and how much, being made prior to admission to the asylum, would avoid imposition. If some such system were adopted, I think we ought to use our endeavours to relieve ourselves of some of our overcrowding by entering heartily into the scheme; and without raising objections, carefully study the difficulties that may stand in the way, with the view of either dissipating them, or distinctly demonstrating the unsuitability of our colonial life to such a method of caring for and treating the harmless insane in a manner not more expensive to the State than institutional control, and in such numbers as to make it worth the trouble involved.

Having thus far given sufficient material for discussion, I would like to lay before you something of what has been done in Scotland on this method of treating the insane in private dwellings, and this I am able to do through the kindness of Dr. Sibbald, of the Scotch Lunacy Board; Dr. Clouston, the Physician Superintendent of the Royal Edinburgh Asylum, Morningside; and my old friend, Dr. Turnbull, of the Fife and Kinross Asylum; all of whom have for some time been liberally supplying me with information.

Mainly then, Scotland depends on the Poor Law, through its officers, to provide the guardians and the medical attendant, the Lunacy Board carrying out the inspection by Deputy Commissioners. Each asylum has its district, and each district its various parishes, with their Inspectors of Poor, and Union Doctors, who have to attend and provide physic for all paupers within a radius of from a few miles in some places up to a great many in others; and for each quarterly visit to, and report on, a boarded-out lunatic, he receives the sum of two shillings and six-pence, in addition to the small annual salary for which he contracts to serve the Guardians of his Union.

These officers of the Poor Law Board receive a code of instructions from the Lunacy Board, setting forth the procedure for placing pauper lunatics in private dwellings under its sanction, and the conditions on which sanction is granted, from which it will be seen that the Poor Inspector has a great deal to do, and yet with his help, Superintendents of asylums have been able to vigorously put in practice a system of relief to their overcrowding.

"*Procedure for placing Pauper Lunatics in Private Dwellings under Sanction of the Board, and Conditions on which their Residence in Private Dwellings is Sanctioned.*

"Pauper lunatics who do not require asylum treatment may, on becoming chargeable, remain in private dwellings under suitable guardianship, with the sanction of the Board, which is granted on the application of the Inspector of Poor, accompanied by two medical certificates according to Form D.

"Or they may be removed from establishments for the insane, and be placed under suitable guardianship in private dwellings under one or other of the procedures described. In these latter cases, the application for the Board's sanction (which is only necessary when the patient remains a pauper) must be made in the manner described in Rule 16, after the patient has been discharged, and need not be accompanied by any medical certificate unless such be specially called for.

"Not more than one pauper lunatic can be legally placed in any private dwelling, unless the occupier of such dwelling hold a special license from the Board. This license is granted on application by Inspector of Poor, in accordance with the regulations laid down.

"The sanctions granted by the Board for the reception of lunatics into private dwellings, whether singly, or in numbers not exceeding four, are valid only for the particular house, and the particular guardian named in the application; and no Inspector of Poor shall remove any pauper lunatic so sanctioned to any other dwelling, or shall change his guardian, or make any alteration in the nature or amount of the parochial allowance, without intimating the facts to the General Board.

"Pauper lunatics sanctioned by the Board to live in private dwellings must be comfortably housed, sufficiently fed and clothed, and otherwise suitably provided for. They must be placed under the charge of properly remunerated, efficient, and trustworthy guardians, whose duty it shall be to carry carefully out the Board's directions to persons receiving pauper patients.

"Every pauper lunatic, whose residence in any private dwelling has been sanctioned by the Board, must be visited within three weeks after

such sanction has been granted, and at least once every three months thereafter, by a medical man appointed to perform that duty by the Parochial Board of the parish to which the lunatic is chargeable, unless the General Board shall, on special application by the Inspector of Poor, otherwise regulate such visits; and the medical officer shall, at every such visit, enter in the visiting-book for pauper patients in private dwellings, which shall be kept in the house in which the lunatic resides, a report of the mental and bodily condition in which he found the lunatic, with any suggestions or recommendations for improving the condition of the patient which he may think desirable; and any medical person who shall make any such entry without having visited the patient within seven days previous to such entry, is liable in a penalty not exceeding ten pounds for every such offence.

"Suggestions or recommendations for improving a patient's condition, recorded by the medical officer, shall be at once reported by him to the Inspector of Poor of the parish to which the lunatic is chargeable, who shall either see that they receive immediate effect, or shall report to the General Board his reasons for not carrying them out.

"It shall be the duty of the Inspector of Poor of the parish to which an out-door lunatic is chargeable to visit the patient at least twice a year, and to record the visit on its proper page in the book in which the medical officer's visits are recorded; and in the event of the lunatic residing beyond his parish of settlement, it shall be the duty of the Inspector of that parish, if he does not visit the patient himself, to provide for his being visited by the Inspector of Poor of the parish of residence; in which case it shall be the duty of the Inspector of the parish of settlement to assure himself that these visits are regularly made and recorded.

"If a pauper lunatic under the sanction of the Board is regarded by them for any reason as unfit for residence in a private dwelling; or if any of the conditions as to accommodation, guardianship, treatment, or visitation is not observed, the Board may withdraw their sanction, and require the patient's removal to an asylum; and any pauper lunatic who has been removed from an asylum, and boarded out, shall be sent back to it within fourteen days after the Inspector of Poor receives the order of the General Board to that effect.

"No pauper lunatic residing in any private dwelling shall be removed from the poor-roll unless by a minute of the Parochial Board granted at a duly constituted meeting, and unless sufficient evidence be produced to the Parochial Board that his care and treatment will be provided for in a manner which they regard as satisfactory. When a pauper lunatic who has been removed from an asylum is ordered by the General Board to be sent back, the patient's relatives cannot remove his name from the poor-roll without the Board's sanction.

"When a pauper lunatic in a private dwelling ceases to be chargeable as an out-door patient, by removal from the poor-roll, or recovery, or removal to an establishment for lunatics, or death, intimation thereof must be given to the General Board within fourteen days. A notice of recovery must be accompanied by a certificate of sanity, and in cases of death, the cause should be stated. Removal to an asylum must be effected by application for a Sheriff's order on Form A.

"*Parliamentary Grant in aid of the Cost of Maintenance of Pauper Lunatics.*

"No claim for participation in the Parliamentary grant in aid of the cost of maintenance of pauper lunatics is admitted, unless the General Board give a certificate that the patient has been necessarily detained, and properly cared for, in the place in which he was maintained during the period for which the claim is made.

"A claim made on account of a pauper lunatic maintained in an establishment for the insane, will be invalidated :—

"(1) If there is reason to believe that his mental or bodily health is injuriously affected by residence in the institution in which he is detained.

"(2) If his condition renders him unsuitable for treatment in the particular class of institution in which he is placed.

"(3) If the Board shall be of opinion that he is detained in an establishment for the insane, notwithstanding that he could be satisfactorily provided for in a private dwelling, were reasonable efforts to find a proper guardian made by the Inspector of Poor, and adequate payment offered by the Parochial Board.

"Claims made on account of pauper lunatics maintained in private dwellings under the Board's sanction, will be invalidated, in the event of any one of the following conditions not being complied with :—

"(1) They shall be comfortably housed, clothed, and fed.

"(2) They shall be in every way as well treated as other members of the household.

"(3) They shall receive such personal care and attendance as will ensure their comfort and safety.

"(4) Every reasonable effort shall be made to improve their condition, and contribute to their happiness.

"(5) The Inspector of Poor shall make two visits yearly to each patient, and shall record them in the visiting book, as prescribed by the Board.

"(6) A Medical Officer, appointed by the Parochial Board, shall make four visits yearly to each patient, and shall record them in the visiting book, as prescribed by the Board."

Motives of economy help the Parochial Boards to regard the system with favour, since the average expense in boarding out pauper lunatics is less than that required for their maintenance in asylums, and the cost of asylum accommodation is altogether avoided. From this it will be seen that lunacy and pauperism go hand in hand, the laws in each being to provide for care and treatment ; lunacy producing pauperism, and pauperism lunacy.

Concerning the guardians, the relatives are naturally preferred where suitable, but strangers are found to do better in a large proportion of the cases.

To sum up, the general views in Scotland are, that "no one questions the value of boarding out pauper patients, from suitable cases, suitable

guardians, and proper supervision," but that such a combination is frequently difficult to obtain, and that it is only a poor-house where a profit could be made out of six or seven shillings a week, if the patients were not neglected. It must also be remembered that there is no royal road to the selection of the patients, as many likely ones prove unsuitable soon after going out, and somewhat unlikely ones agreeably disappoint us, yet the question is mainly a financial one, though mental improvement occurs through its adoption, as it does in our existing probationary system of trial leave.

"It has been frequently pointed out in the reports of the Board, that the number of persons in a community who are treated as lunatics depends on various circumstances. Among the most important are the stage of development in civilisation to which the community has attained, the density of the population, the facilities which exist for the treatment of persons as lunatics, and the relation of insanity to the system of relief of the poor. From the complex operation of such causes, the proportion of persons treated as lunatics has been materially altered in most of the Scotch counties since the enactment of the present lunacy law. In the county of Sutherland, for example, the number of persons in establishments for the insane was in 1859 equivalent to only 45 per 100,000 of the population, and it was in 1886 equivalent to 273 per 100,000. In the county of Argyle it was only 95 per 100,000 in 1859, and in 1887 it was 355 per 100,000. The changes in these counties are no doubt chiefly due (1) to the provision of more conveniently-situated asylum accommodation; and (2) to the operation of the poor-law, in combination with the Government grant in aid of the maintenance of pauper lunatics. There has been an increase in the proportion to population of pauper lunatics in asylums in every county, except in Midlothian, the increase for the whole of Scotland being equivalent to a rise from 102 to 184 per 100,000 of the population. It is remarkable that, according to the figures in the table, there was in the case of the county of Midlothian, instead of an increase, a fall per 100,000 from 185 to 173. Had the whole of Scotland therefore been in the position of Midlothian, the total figures would, as regards the statistics relating to establishments for the insane, have given the appearance of a decrease in the amount of pauper lunacy in proportion to population, instead of giving, as they actually do, an appearance of a large increase. It is remarkable also that the proportion which Scotland as a whole has now reached should be almost exactly what was shown by Midlothian at the beginning of the period to which our statistics refer. This almost seems to justify the assertion that pauper lunacy in Midlothian had, at the commencement of the period, reached or rather slightly exceeded what, under the present social conditions, is its normal amount. What may be maintained without hesitation is, that if there had been, as is often alleged, an increased production of insanity in the community, the additional facilities furnished by the law for providing asylum accommodation in all parts of the country would have led to an increase in the proportion of the community detained as pauper lunatics in asylums in Midlothian not less than elsewhere.

"It will be observed that in these remarks only those pauper lunatics have been dealt with who are inmates of establishments, and that no

account has been taken of those resident in private dwellings. The reason for this is that, in dealing with the question of the prevalence of insanity in any portion of the community, there are certain advantages in restricting our consideration to those who require detention. One advantage is the fact that the persons dealt with are believed to require detention involves the introduction of a practical element, which gives a degree of definiteness to their condition. The grounds which are held to justify a certificate of lunacy must always be more or less arbitrarily determined; but their arbitrary character is to some extent diminished when it is necessary at the same time to determine that the patient cannot be satisfactorily dealt with out of an asylum. The responsibilities and obligations which are involved in sending a patient to an asylum are calculated to exercise a steadying effect on the action of those who give the necessary certificates, and to increase the soundness of statistics which are based upon them.

"But, though the class of paupers in private dwellings who are dealt with as lunatics is perhaps more loosely defined than the class in asylums, a glance at their position in the county of Midlothian is both interesting and instructive. And here it may be well to allude to a misapprehension which seems sometimes to exist. It appears sometimes to be supposed that the providing for pauper lunatics in private dwellings in Scotland is a result of recent administration. The fact is, that the number of persons provided for in this way does not bear so large a proportion to the population of the country now as it did when the present lunacy system came into operation. The number has indeed increased from 1877 in the year 1859 to 2140 in 1887; but this is more than 300 short of what would have been accounted for by the increased population of the country.

"The position of pauper patients in private dwellings has, however, been altered in important respects by the administration of the Board. During the earlier years the efforts of the Board were directed mainly to the sending to asylums of patients who were unsuitable for treatment in private dwellings, and to the ameloriation of the condition of those who, though suitable for such treatment, were inadequately provided for. In pursuance of this course, the number of pauper lunatics in private dwellings was considerably diminished. But it was prevented from diminishing so much as it would otherwise have done by the fact that a large number of persons previously unreported, who were suitable for care in private dwellings, were during the same period brought under the supervision of the Board. It was recognised by the Board, from an early period of their administration, that the providing for a certain number of pauper lunatics in private dwellings was one of the elements of a proper system of lunacy administration. The Board have not, it will be seen, introduced a new mode of providing for pauper lunatics. They have only endeavoured to place under proper regulation a mode of provision which has always existed in Scotland, and which, indeed, has always existed in every country. The difference between the system which they have been enabled to establish and that of other countries, consists in the fact that the patients so provided for are under the supervision of a central authority, which requires to be satisfied that they are suitable for such treatment, and that they will receive it in a satis-

factory manner; while, in most other countries, those who are so provided for may be said to be merely left outside of the general lunacy administration.

"In order to understand fully the present position of the matter in Scotland, it is necessary however, to allude to another important change which has been brought about under the Board's administration. The position of the patients has been altered in a way which is chiefly indicated in the statistics of the Board, by the decrease in the number of patients resident with relatives, and the increase in the number resident with strangers. A few words are necessary to explain the significance of this change. The extent of the change is shown in the following statement:—

Actual Number of Pauper Lunatics in Private Dwellings.

		With Relatives.	With Strangers and Alone.*	Totals.
Midlothian ..	1859	64	32	96
	1887	46	186	232
Scotland ..	1859	1482	395	1877
	1887	972	1168	2140

Proportions per 100,000 *of Population.*

		With Relatives.	With Strangers and Alone.*	Totals.
Midlothian ..	1859	24	12	36
	1887	11	44	55
Scotland ..	1859	49	13	62
	1887	25	30	55

"As has been stated in the Reports of the Board, the decrease in the number of patients resident with relatives is not regarded as being in itself a desirable change. The view of the Board has always been that, where asylum treatment does not seem to be required, the patients should be enabled to live as much as possible "in a way little removed in its character from the mode of life which they would have led had they not suffered from insanity."† For this purpose it is obviously desirable that they should live with relatives, rather than with strangers. Two reasons have led to an increase in the number of those under the charge of strangers, and to a decrease in the number of those living with relatives. One reason is, that relatives are not so frequently willing as they once were, to undertake the care of the patients; and another is, that it often happens that the relatives who would receive them are unable, from unfitness either in themselves or in their circumstances, to furnish such treatment and accommodation as are necessary for the welfare of the patients. It is not given to every one to have those personal qualities which are required in a good guardian of the insane, and some who would, from family relationship, naturally be their guardians, are specially deficient in such qualities. Many of the cases which, in the earlier years of the Board's administration, were the cause of difficulty and anxiety, were those in which patients were

* It is rarely, and only in very special circumstances, that a pauper lunatic is allowed to live alone. There have, however, been a few such cases, and these have been tabulated along with those resident with strangers. Their number being so small, it has been thought unnecessary to separate them.

† Twenty-seventh Annual Report of the Board, page xii.

under the charge of incapable mothers, or other near relatives. It will be easily understood, that the amelioration of the condition of such patients while with their relatives is difficult, and often impossible, and the removal of the patients to other care, against the wish of the relatives is often found to be impracticable. A considerable number of such removals have however been effected. But the chief cause of the increase in the number of patients resident with strangers is, that the circumstances of their relatives often make it impossible for them to furnish the kind of accommodation and treatment which the patients require. This remark applies especially to the case of pauper lunatics belonging to urban parishes, and it is among these patients that the great proportion of those now resident with strangers are found. In urban districts, the majority of the relatives of pauper lunatics are found in the heart of great towns, and such localities are unsuitable for a large proportion of the patients. Due supervision, an adequate amount of open air and exercise, and the provision of suitable occupation cannot be obtained there; and in such circumstances, the only alternatives are either to keep the patients in asylums, or to place them in suitable localities with strangers."

A general discussion by those present took place, resulting in the condemnation of any huge system of cottage asylums being adopted, as has been foreshadowed by the Victorian Government, the plan most highly thought of being that of a combination of the block and cottage, with a detached hospital for acute cases where all appliances for treatment should be at hand. The boarding out of the harmless insane was approved of, but as a system, it was feared that the conditions of colonial life would militate against any marked success in such numbers as to warrant the large expenditure which would certainly be necessary.

Dr. Beattie Smith, in reply, remarked that he was pleased that his views had met with such general acceptation, and urged that a willing and energetic spirit be brought to bear on the subject of treatment in private dwellings for the poorer classes, as a means of relieving our overcrowding, if for nothing else; and that, although America had found it "impossible to secure reliable and proper persons to take charge of patients, except at an impracticable expense," Victoria ought to boldly strike out for herself, and demonstrate her own capabilities or the reverse in this direction, so as to at once settle upon a definite plan of future extension of accommodation.

The President, Dr. Manning, and several members of the Section, accompanied by the Hon. Secretary, visited the Metropolitan Asylum at Kew. After a careful inspection of the buildings, general arrangements, and grounds, the opinion was openly expressed that the institution had been markedly improved within the past few years, and reflected nothing but praise on the officers concerned.

The separate building for idiots received a large share of attention, as the system of treatment therein is entirely a new feature in Australian asylums, the methods employed being a distinct advance on those used in any of the other colonies.

Other members of Congress visited the asylums, and were pleased with their reception and what they saw.

SECTION OF PHARMACOLOGY.

PRESIDENT'S ADDRESS.

By Baron Sir Ferdinand von Mueller, F.R.S., K.C.M.G., Ph.D.

Government Botanist of Victoria.

Gentlemen,—Through the generous sentiments of the President and the Councillors of the Congress, it devolves on me now to open the proceedings in the section for Pharmacology, or what may be regarded as equivalent for Therapeutics, Materia Medica and Pharmacy unitedly, a highly honourable task indeed, on which however I enter with the greatest diffidence.

Though in Pathology our knowledge be ever so accurate for diagnosis and prognosis of the characteristics and course of diseases; though in Physiology our cognisance of vital processes be ever so intimate of normal conditions, and contrastingly of morbid changes, even if all this be ever so well supported by Chemistry and Microscopology in the minutest details; though Surgery be ever so dexterous and experienced, guided by Anatomy even in most subtle particularities; yet treatment may fail, if through Therapeutics cannot be brought to bear the most judicious selection of remedies, and if through Pharmacy the genuineness and purity of medicinal substances cannot be secured.

Therapy in its widest sense is constantly called into requisition by all other branches of applied medicine, to yield the weapons to be wielded for subduing human sufferings from whatever ailment. Through Therapeutics the treatment in most cases assumes its practical bearing, or at all events receives powerful aid for final curative accomplishment. Indeed, Medicine gains therewith mainly its expression of reality, and renders therewith culminating efforts. What the Aeneis said so long ago—*Scire potestates herbarum usumque medendi*, will indeed hold good for all times.

Being taken back cursorily in our reflections to the dawning of our profession, we may also here with veneration approach the founder, particularly in its pathologic aspects, of scientific medicine. Hippocrates, much more than 2000 years ago, employed already in a rational method some of the very remedies which even under the same designation still hold a place in therapeutic estimation at the present day; the

Hellebore, Mallow, Rue, Euphorbia, Soapwort, Sumach, Chio-Terebinth, Aristolochia, Pomegranate, Fennel, Chamomile, Mint, Pennyroyal, Thyme, Iris and Squill were among his medicinal treasures; and the Myrtle, used by this descendant of the Asclepiades, seems to have offered to him already an antiseptic, closely akin to that of our Eucalyptus trees here.

I will not detain you with explicit observations on the much larger display of vegetable medicines used by Theophrastos, Dioskorides, Galenus, Plinius and others among the leading ancient physicians, though many plants were ordered then as they are prescribed now; and—what is fascinating to contemplate—thus stood the test of all ages.

In the able surgical address given by our honoured President at the Adelaide Congress, he pointed especially to the two greatest achievements in recent advances of medicine—those of anæsthetic applications, and antiseptic treatments—both originating in the latter half of this century or nearly so, and both pertaining more particularly to that branch of science, represented by the Section in which we are now assembled here. Indeed, only through these auxiliaries new courageous yet justifiable operations came within the range of possibility, and surgery could thus make the extraordinarily rapid strides during the last few decades towards its culminating development in the present day. Therapy, again, is indebted for this vast extension of its scope chiefly to organic chemistry and microscopic biology. What a splendid co-operation of men of genius! What a sublime triumph of united mental force for the grandest of worldly purposes! For general medicine and almost equal in importance to the two agencies mentioned, Therapy has also yielded more lately—as you are all aware—chemical concentration, and therewith largely the means of hypodermic injection for multifarious administration; these are two factors in pathologic calculations, to gain results of almost unerring exactitude. Perhaps I should not have alluded to all this, had we not to invoke these methods for novel experiments, to be instituted also here with Australian material. Armed with these requisites, we obtain facilities for watching effects, least disturbed by counteractions, on the living organism, and we are enabled to draw logical conclusions therefrom, applicable in professional exercise subsequently. Thus the questions will become gradually solved, how far each medicinal substance, chemically definable, affects the constituents, either singly or connectedly, of any particular organs of the living body, and how far morbid elements, invading or developed, would really be singled out, to be seized in each instance for restoration of normality.

What chemistry thus has done in comparatively recent times for Therapy, may be instanced by two cardinal remedies, both undoubtedly

destined to hold a permanent place in medicine. From so unpromising a material as coal-tar, were not only evolved the unsurpassably brilliant colours of aniline, and the marvellous saccharine (important already as a remedy in vesical affections), but it also yielded phenol, one of the most powerful antiseptics, now universally applied in surgical and hygienic Therapy. Phenol again stands in close chemical relation to salicylic acid, in which we possess one of the best among recent offers to the materia medica, especially for internal use; but both, in reality, are among the wondrous legacies from a former world of vegetation, which, though lifeless in its remnants, is replete still with incalculable riches even for us in medicine.

Etherisation began through American thought in 1846. Chloroform, as another of the glorious gifts from chemical research, came into use almost simultaneously; but Phenol, although isolated as long ago as 1834, by Runge, was rendered available for Phenolisation only in 1861, through the ingenuity of a British surgeon; and Chloral, though among the earlier discoveries of Liebig, we know medicinally only since twenty years, so that many of us here have utilised these important anæsthetics, antiseptics and hypnotics from the commencement.

With vastly improved microscopic instruments, which 200 years ago would have charmed and amazed a medical worker *in minutiis* like Loeuvenhoek, were made those significant revelations particularly in our days, through which so largely specific forms of diseases could biologically be defined and evolutionarily traced. Although these startling observations pertain mainly to the pathologic dominion of medicine, yet thereby also Therapy stepped into a new phase of its offerings, inasmuch as the great principle of inoculation can now be widely extended, but—let us hope—guardedly, to be always restricted within due bounds. The continuous application of the microscope is now-a-days also indispensable for therapeutic and pharmaceutic research, to study organologically and histologically the sources as well as the products and educts of plant-life and whatever else lies within the cyclus of therapeutics, not only for an accurate knowledge of what—thus far—we do possess in the materia medica, but also to lead us on comprehensively in rational comparisons to extended and independent researches, particularly so in a country almost new, like ours.

Before I allude to what may most interest this distinguished assembly, to Australian data, some, I trust, of originality—it seems preferable to single out a few of the most modern gains, which promise to be of permanency for therapeutics. The Cola-seed of Western Africa, although described by Caspar Bauhin fully 300 years ago, while he was Professor of Medicine in Basle, has only now entered into the materia medica; it allays thirst like Coca-leaves, and thus also should prove

acceptable to diabetic patients; but like the Guarana-Paullinia from South America, it affords also copiously Caffeïne, and may therefore be entitled to notice for preparing a refreshing and mildly stimulating beverage; indeed the Cola-paste, like that of Guarana, has recently become an article of commerce. The Pilocarpus may now be regarded as a fairly established and welcome acquisition, more so still as its active principles, an oil and an alkaloid, can readily be isolated; the sialagogue action of the plant seems not yet sufficiently appreciated, and may point to some value in diphtheria. Strange to say, a similar property has lately been ascribed even to our ordinary garden tulip; while the lovely lily of the valley of our home-countries, which we easily could naturalise in forest-glens, claims also admission now, supported by high authorities, among them Dujardin-Beaumetz. Yet, as shown by Labbée and mentioned by the great therapeutist just named, Matthioli, the physician of the Emperor Maximilian II, more than 300 years ago, insisted already on its value as a cardiac sedative; while Sée and other physicians now place Convallaria next to Digitalis, with the advantage of being a comparatively harmless substitute, indicated as particularly eligible in mitral diseases with hydrops, its efficacy depending on two glucosides. As regards Melbourne literature, a brief reference to the Convallaria occurs already in the edition of 1885 of "Select Plants for Industrial Culture and Naturalisation." Let us lay stress on this resuscitation of one of the best known of all plants for medicine, to show how even the most valuable may sink undeservedly into oblivion. If Strophanthus should fulfil the expectations set on it as a cardiac tonic, then a clue would be given to the probable medicinal worth of a large series of other apocynaceous plants, some occurring also in this part of the world; and the maxim, that natural affinity often indicates similar medicinal properties, would be brought to a further test. Quite in a different direction suddenly turns up a plant, as familiar to us as the tulip or lily of the valley, one from which we would least expect any utility for strictly medicinal purposes, namely, the Fagopyrum, because two practitioners in the United States, Dr. A. M. Duncan and subsequently Dr. P. S. Root, have demonstrated that the groats-grain of Fagopyrum in cake-form is safely available for diabetes-patients, notwithstanding the starchy but evidently peculiar contents of the grain, the use of which does not increase the glycosuria. Such a fact is again significant as showing how an article, familiar for centuries as a food, may escape therapeutic recognition for lengthened periods.

Passing on to a different turn in our subject, we may ask, what future is before the Sulphonal? It was discovered and recently introduced by Professors Kast and Robbast, and subsequently more particularly by

Professors Schwalbe, Guttmann and Otto as a hypnotic free of danger and signally effectual, when the agrypnia arises from purely nervous irritability, no unpleasant subsequent effects being observed; it is further claimed for this new remedy, that it produces a normal sleep, and acts even after long use of narcotics, is tasteless and devoid of odour, affects neither the digestive nor the respiratory organs, according to a connected report by Dr. Nevinny. Should all this be attainable in a majority of cases only, almost a kind of panacea would be secured for an endless number of sufferers. The Sulphonal is a solid combination of sulphurous oxide, with a certain proportion of carbon. It seems preferable to either Amylene-hydrate or Paraldehyde, with an action more prolonged than that of hydrate of chloral, and with this further advantage—so far as we are hitherto aware—of causing no subsequent functional impairments. Beyond the well recognised Amylene-hydrate and the Nitrite of Amyl, various other chemical compounds of the Amyl-series seem forthcoming for therapeutic purposes, some of a complexity, in the long array of their chemical symbols, that only a thoroughly mathematic mind can grasp their constitution; but it is quite beyond the scope of this address to enter into particulars of this promising subject.

But here it might suggestively be also asked, could not some other safe and controllable means be devised, to lower the bodily temperature in all sorts of fever, and perhaps also in insomnia, such slight and cautious cooling to extend particularly towards the nervous centres. Curious as mildly sleep-inducing is even a pleasant fruit, that of the North-American Casimiroa, approaching in affinity to the Orange-tribe, but yet foreign to our tables.

How for periods of great length the exact origin of some drugs may remain obscure, is exemplified by the Chinese Star-Anise; for it was not many months ago, that Sir Joseph Hooker became enabled to identify and describe the particular Illicium (I. verum), which furnished during three centuries the star-anise, chiefly as a component of a cough-tea of great popularity, particularly used on the continent of Europe.

It might reproachfully be asked, why with such a host of novel plants to experiment on, as we possess in Australia, no ampler records of their medicinal properties are extant. But for such purposes real facilities are solely afforded in hospital-practice, and even there only sparingly; because practitioners are hardly justified in their ordinary calls to enter on trials of this kind, unless by preliminary tests on organisms, other than the human, a fair insight has been obtained of what may be expected from any altogether new remedies; and even then, in experiments on higher vertebrata, conflicts may be encountered with some small part of the community, should vivisection require exceptionally to be resorted to. Moreover such experiments are in their

results but too often negative, and then rather discouraging. In one direction however wide progress has been made; it is this: the diagnoses of 9000 species of flowering plants of the fifth continent became reliably fixed, whereby simultaneously a firm basis was gained for applied science in all its ramifications, to trace with every accuracy the vegetable products of Australia, including those for medical use, to their specific sources. Perhaps this is not much; still it should be remembered, that our institutions all had to be built up in these young colonies by the present generation or the one just passed away. More perhaps might have been done, but individual life is too short for progressive science. What however thus far has been accomplished, may stimulate into extra efforts, which otherwise the practitioner in his almost restless life, or the academic teacher in his already onerous calling might not carry out connectedly nor extensively. But what an immensity of working material is placed before us also for therapeutics in a new continent, often with the charm of absolute novelty! If we are—so far—much in arrear as early colonisers of a continent, of which however large portions are not yet even geographically opened up, instances like the following should be remembered, that even the highly powerful alkaloid Cytisin, first produced by Husemann and Marne from the seeds of the common Laburnum-tree of gardens anywhere, has never yet entered any pharmacopœia, though in experiments with animals its formidable action on the spinal cord and peripheric motor-nerves was readily perceived, on incautious administration to the extent of paralysis, the muscular system however remaining unaffected. So it is also only through recent researches of Schmiedeberg, that the medicinal similarity of the common Oleander—through its glucosid Neriin—to Digitalis became demonstrated; and yet this handsome garden-bush was mentioned already as poisonous in the remotest records of antiquity. A commencement has however been made here. Thanks to the erudite aptitude displayed in therapeutics by Dr. Bancroft, both species of Duboisia, as you know, have, with some slight aid of my own, been physiologically investigated, of which enquiry advantage was promptly taken in ophthalmic surgery. Let me also remind you here, that one of the best kinds of Catechu can be prepared from Australian wattle-bark.

We shall listen with particular interest to the information, which will be offered by Dr. John Reid in regard to the active principle of an Australian Spurge. The small herbaceous Euphorbia Drummondi, here referred to, might almost be considered identical with the E. Chamaesyce from the countries at the Mediterranean Sea, one well known already to Dioskorides and Plinius, and specially referred to in their writings. A congeneric herb E. pilulifera, which from the warmer regions of Asia has

established itself in Eastern Australia as a weed, seems to be much used as a domestic medicine in China; and, to judge from Australian experiences, has evidently a sedative action on the respiratory organs, having been particularly lauded in asthma. Thus a wide field for enquiry is opened among these kinds of plants, numbering over half a thousand species, variously dispersed through the world, about twenty occurring in Australia, one of them big and cactus-like in the remotest north of Queensland. Without intending to anticipate discussion, I may briefly observe, that in the original analysis of the highly acrid "Euphorbium" (obtained chiefly from North-African succulent shrubby species) as instituted by Brandes, and also in some few subsequent analyses, what may be the real effective constituent in the copious resinous compound could chemically not be isolated. Possibly an oily alkaloid may exist in the milk-sap of Euphorbia, just as Lobelin in that of Lobelia. Flueckiger has shown the Euphorbon to be closely allied to Lactucerin or Lactucone. In all likelihood, a very similar principle pervades more or less the milk-sap of all Euphorbias, accompanied by other modifying ingredients.

It would be tiresome perhaps, to enter into many technicalities; but this much I may be allowed to say, that four large orders of plants, mainly or almost entirely Australian—the Goodeniaceæ, Myoporinæ, Candolleaceæ and Epacrideæ, remain, as regards medicinal or even simply chemical experiments, almost untouched. Whether the bitter principle of some Goodeniaceæ is merely tonic, and whether the noxious properties of some Myoporinæ have therapeutic significance, remains yet unascertained. Special laboratory arrangements are needed, to work with advantage on subjects like these, for systematising from a physiologic point of view, especially when on a new line of investigations we are really without any guidance whatever.

The Bitterbark of Riverina and other tracts of East Australia, from Alstonia constricta, is locally very celebrated as a tonic, and even as effectual in ague; it was chemically examined in this City, quite independently of the researches of Hesse. Oil of Santalum, officinal only since some years, is obtainable in a remarkable proportion from the fragrant wood of the West-Australian Santalum cygnorum.

Leguminosæ—ordinarily the second largest of groups in the universal empire of plants—stand for the purposes of medicinal research next to Myrtaceæ in importance, so far as Australia is concerned, but are in their display of qualities much more varied. Though they yield some plants of great moment for human sustenance and by far the largest portion of alimentary pasture-herbs, yet they include in their wide embrace also some of the most deadly, such as the Calabar-bean. The uninitiated would be lulled into security also here, were he to meet

some of the dangerous yet innocent looking members of the order. Erythrophlœum Guineense, one of the ordeal-trees of the wild and superstitious hordes of Western Africa, was shown by a Melbourne citizen, when he was in the field many years ago, to have almost its counter-part in an Australian tree of wide tropical distribution (E. Laboucherii), whereas quite lately the existence of a third species (E. Fordii) in South-China has been demonstrated. In this genus we have again an admirable example, how we can often argue from systematic affinity also on the utilitarian properties of plants. Thus the Erythrophlœin is likewise largely developed in the Australian tree. According to Lewin, a local anæsthesia, extending occasionally to the length of two days, may be produced by it. Some melancholy interest attaches to our Erythrophlæum, because it was the ill-fated Dr. Leichhardt, whose place of perishing is not even yet known, who through his first glorious expedition along the northern portion of the Australian Continent, brought it as "Leguminous Ironbark-tree" under notice, not however suspecting its medicinal significance. Indeed, the clue to the virulence of these trees was given by the negroes, who employ their plant also to stupefy fish, just as the Antilleans do the bark of the medicinal Piscidia, the autochthones of North America branches of Gelsemium, and the Australian and some other nomads often sprigs of some Tephrosias and Tribulus for the same purpose. Abrus, even longer known than the Cola, became recognised in its seemingly unique importance only within this decade, first by De Wecker; as a plant of all the tropics it extends also to Australia, where it was noticed already in 1699 by Dampier: its usefulness in Trachoma and Pannus was proved also here by Mr. Rudall and other ophthalmic surgeons, notwithstanding some danger of atrophy of the conjunctiva possibly arising from the use of this seed, as pointed out particularly by Knapp and some other surgeons. If I rightly remember, Martius already alludes to some therapeutic power of the Abrus in his "Specimen Materiæ Medicæ Brasiliensis," published in 1824 soon after his return from South America. Sattler seems to have discovered a particular micro-organism, which has been supposed to set up the fermentive inflammation, by which it is sought to destroy the morbid layer. The use of Abrus-seed has latterly been suggested in the treatment of Epithelioma. Curious to record, the spores of Puff-balls have been recommended for the same purpose. I should forestall the learned and zealous honorary secretary of this Section of the Congress, were I to discuss, if even only preliminarily, the interesting data connected with the poison-shrubs of South-Western Australia, species of Gastrolobium and Oxylobium. Dr. Grant will bring before you the new observations, instituted

purposely by Dr. Rosselloty at the instance of Dr. Waylen, the Chief Medical Officer of Western Australia; this will be all the more worthy of your attention, as the particular group of these simple-leaved harsh leguminous shrubs is restricted to this part of the world. Let us hope, that at a future meeting of the Congress the toxicology of the vetch-like Swainsonas will also become elucidated in the interest of medicine. Moreover, they do not stand alone in this respect, inasmuch as some species of the closely allied genera Astragalus and Lessertia elsewhere are also known to contain powerful principles never yet studied. The cerebral derangements, caused to horses particularly by Swainsonas, especially S. Greyana, the feared Darling-Pea, have long been witnessed, but never been physiologically traced to their origin and in their course. Dr. Frederick Lloyd of this city ascertained in another leguminous plant of ours, the shrubby Goodia, deleterious properties, and even our native Indigofera is held in suspicion, while the use of Daviesia latifolia as a substitute for hops is actually forbidden on account of injuriousness. And why do I allude to all this, which may seem foreign to our present subject? Because, as recent therapeutics have given us Pilocarpin, Duboisin, Cocaine, Physostigmin, Curarine, &c., leaving inorganic substances out of consideration, so we cannot foretell what may be revealed to us for the benefit of Therapy, if the indications just given are methodically followed up. Nevertheless, we all feel that we should be cautious not to burden the stores of materia medica with superfluous additions, such as the Gonolobus Condurango of transient glory. It remains a remarkable fact, that among the 150,000 kinds of flowering plants of the universal vegetation, only a few Cinchonas give us quinine, for which we have as yet no real equivalent in any other plant through all the wide world. Cinchonas are indeed a glorious gift! Surgeon-Major Dr. Geo. King, the eminent Director of the Botanic Garden of Calcutta, brought within reach of even the unprosperous millions of fever-sufferers in India the unseparated semi-crude alkaloids inexpensively from Indian plantations, the area of which is now perhaps larger already than the whole remaining Cinchona-forests of South America. It might in addition be added here, that through the whole of East Australia in temperate, frostless mountain-regions Cinchonas might be reared millionfold. Cinchonas ripened even germinable seeds not many miles from Port Phillip. What a capability therefore for wide medicinal culture!

Should our amply dispersed Myriogynes be compared, on account of their sternutatory properties, rather to Convallaria than to Arnica, the natural affinity being largely with the latter, or does the Myriogyne possess properties of its own? Could Leptandrin, as an American Cholagogue of recent introduction, be obtained from our own similar

Veronicas and also from those of New Zealand? Ought the particular Gratiola, which fringes our brooks, to remain unnoticed, when the European ranked amongst the foremost hydragogues in the widest sense of the word through three centuries, so much so that the name "gratia dei" was applied to this herb, as significant as that of "Cascara sagrada" for Rhamnus alnifolius? What is the precise therapeutic relation of our Boronias and Eriostemons to the allied Bucco-bushes of South Africa? Can Senna be obtained from any of our Cassias? Can we dispense with Chirata, by using our own Erythræa here? Can the very potent acrid principle of the Palm-like Cycas- and Zamia-species be chemically defined, having hitherto, like the active ingredient of Croton-oil and of many delicate fragrances, eluded separation as distinct substances? Are the alkaloids and the aromatic oils of the four Australian Monimiaceous Sassafras trees from as many colonies closely akin? What is the precise position of the seed of Cassia Absus, used for ophthalmic complaints already by the ancient Egyptians, in the therapeutic system, this plant extending naturally to Queensland? Do any of the Australian species of Croton yield an oil comparable to that of the Indian C. Tiglium, or a bark similar to that of the Antillean C. Eluteria? In what way does the blue-flowering Grass-lily of Western Australia (Agrostocrinum) affect the visual apparatus of sheep feeding on this plant, so as to cause blindness, and what conclusions can be drawn therefrom? What is the nature of the intensely bitter principle in some of our Pittosporums? How far can Australian Lobelias replace L. inflata? Can Cocaine be remuneratively obtained from the two species of Erythroxylon, peculiar to tropical Australia? Have the powerful properties of Zygophyllum and Didiscus, manifested by their action on pasture-animals, any counteracting value in some of the morbid affections, with which the therapeutist has to cope?

Such are some of the questions, which to solve on our lines of research devolves especially on us as Australians. Let us strive by united efforts all over this great land of ours to put together an Australian Materia Medica, not a mere collection from vague traditions or crude empiricism, but supported by all auxiliaries of recent medicine, biology and chemistry, so as to render such an opus worthy of our time and of our country.

For Western India a vegetable Materia Medica has just been finished by Surgeon-major W. Dymock; a publication in a similar sense for the Brazilian empire is under progress by Dr. Peckolt. Mr. J. H. Maiden recently commenced to collect in literary form the Australian data hitherto extant. You will all be cognisant, that my presidential colleague on this occasion, Dr. Thomas Dixson, ably translated Professor

Schmiedeberg's "Elements of Pharmacology." From Sir William McGregor, the recently appointed Governor of British New Guinea, we may expect a closer study of the particular form of paludal fever and the Beri-Beri, which rage so severely in some of the lowlands of his territory, and on the treatment of which His Excellency, as an experienced physician, can bring professional knowledge to bear.

It is not generally known, but should not be overlooked at this auspicious Exhibition-period, that the Prince Consort, during his studies at Bonn, was especially devoted to medicine, of which His Royal Highness indeed became a graduate. To this teaching may be traced his wide conception in planning grand enterprises for the furtherance of knowledge in the most practical sense; thus, through his original thoughts and methodic measures, were for the first time brought together, in keen rivalry, yet in peaceful contest, the products and industries of the whole globe—an achievement, which ever since in brilliant repetitions exercised a mighty influence on the scientific and technical progress of the world—an influence which had its reaction also on medicine.

In the Royal Society of England, in the Institute of France, in the Academia dei Lincei and in the Academia Cæsarea Leopoldino-Carolina, all originating in the seventeenth century, Medicine has always been amply represented; indeed, the last-mentioned institution was called forth in 1652 by Dr. Bausch, originally for medicine, and devoted for a long time its efforts to that science solely. The Chirurgical Academy of Paris arose as distinct in 1731 already. I have laid some stress on this, because it shows, that our hope will not be futile that this great organisation of ours, for the furtherance of medical science, will prove one of unimpaired perpetuity, and will connect closely the special achievements of successive generations here in our far southern latitudes.

From the medical ranks arose leaders in whatever direction of progressive thought and inventive application; and why do I mention this? because it was through medical studies in their manifold bearings, that a firm foundation was laid to that contemplative and methodic research combined with the utmost of practical tendency, from which so many discoveries emanated in the most diversified directions; thus Medicine gave us Copernicus, the founder of the planetary system; Linnæus, who first and for all times established the dual names for organic beings as indispensable for rigorously systematising; Jussieu, who through the first third of this century was Dean of the medical faculty of Paris, and who long before constructed for plants that system of natural affinity, which except in one minor direction can never be superseded in grand totality nor in general principles; Davy, who

stands forth as the discoverer of the alkaline bases and the condensability of various gases, not to speak of his other multifarious discoveries; Cuvier, one of the most extensive workers in comparative anatomy and almost its originator; Owen, as the worthy successor to Cuvier's fame, who will ever remain a lustrous ornament also in medical science; Berzelius, as the most universal genius which Chemistry ever possessed; Schiller, as the noblest in sentiments and the sublimest in wording among German poets; De Candolle, as one of the most extensive and philosophical among phytographic writers; Hooker, the foremost now both as a botanic traveller and as a systematist, and who through part of the present decade held the highest position of science-honor in Britain, as occupant of what once was Sir Isaac Newton's chair, and for a time also that of Sir Benjamin Brodie; Huxley, one of the most laborious among elucidators of organographic development. I will pause; it is enough for our present purpose; but the subject is one of inexpressible grandeur! Indeed, Medicine has sent investigators leadingly into all other fields of knowledge, where they have been among the most luminous; and that same science of ours is sure to supply bright spirits also in future ages, far beyond its own specialities.

Perhaps in no other division of the great realm of medicine is the literary material so overwhelmingly ample as in the Section which brings us at this hour together, because the special worker in any other branch is bound to refer frequently—nay almost constantly—to progressive therapy, and indeed is often involuntarily adding to its riches. As writings in these directions of ours are so ramified and pervade medicine in all its bearings, it would be a hopeless task, to enter on an extensive disquisition even of what has thus far been brought before us within the reach of the English language in comparatively recent days. Clearness of method, logical expression, comprehensiveness of view, carefulness of record characterise all the principal new productions in their totality; but while building up is going on anew, sometimes more of what has fallen into absolute decay might be cleared away. Occasionally what is asserted as positively established and under Tacitus' *Relata refero* accepted, will yet have to pass the ordeal of closer, more varied and extensive scrutiny.

As regards zoologic products, obtainable for therapeutic purposes, I will refer only to three—the Moschus, the Castoreum and the Dugong-oil; in reference to the latter its exact value in therapeutics, viewed from a physiological standpoint, was first brought under notice by the still active practitioner, Dr. Will. Hobbs of Brisbane, nearly forty years ago, and as the article can now be got well prepared, it should commend itself to more extensive use. As the Halicore

extends from the Indian Seas to the Queensland shores, this herbivorous Cetacean becomes to us of particular interest. Castoreum, as so costly and as not perhaps superior to other antispasmodics, might well be discarded, although it carries the therapeutic renown of centuries with it, indeed since Hippocrates' time; but it is at all events gratifying to mention, that after the Beaver, through merciless hunting, became extinct also in Britain, this curious and intelligent animal got latterly re-introduced for naturalisation. Musk from the Central Asiatic Musk-deer seems warrantably retained in all Pharmacopœias up to latest time; though not much prescribed in English practice, on the European Continent it has been a cardinal remedy, to arouse promptly the sunken energy of the general nervous system, and was much in use to calm the spasm of the last passing away of vitality. It may be of greater value in epileptic sufferings, than is generally supposed. The naturalisation of the Musk-deer in our higher mountain-regions, particularly in our Alps, would be worthy of being included in the able efforts of our Acclimatisation Society.

On substances with metallic bases for medicine, I shall not dwell in this address; the newest metals have hardly yet been tested for us specially; preparations however from long-known metallic elements have variously been increased with signal advantage in the treatment of disease.

A few words only from my place on medical education, because the moment seems opportune. The phytologic part of the studies at all Universities might be so extended or re-arranged, as to enable the subsequent physician, should he be thrown into an isolated region, to gather for his local wants whatever may indigenously be available, through recognition of generic types or specific forms, allied to those with which he became by early studies acquainted as ordinarily officinal; and here it may be further an apt opportunity to observe, that if on lonely cheerless professional rides or drives through any comparatively new country merely some few miscellaneous flowering or fruiting branchlets were slipped into an envelope, most likely some additional material for constructing the "Flora of the World" would be secured, perhaps even for a new pillar or corner-stone. By collecting excursions into Nature's free fields, the knowledge of plants and indeed of other of her treasures is more permanently impressed on the memory, than by any other method of learning. Such tours need not necessarily be connected with arrangements of Universities, where anyhow the study-work is already so overwhelming, as science-organisations in all the University-cities afford the needful facility, notably also in this metropolis of ours its large and most active Field Naturalists' Club. Training of medical students also in this direction has called forth the

career of some of the greatest zoologists and phytologists of this and past ages.

Much through pharmaceutic aid, our greatest achievements for Australian therapeutics have been with the Eucalyptus. Introduced experimentally as regards its oil to notice already by the earliest medical officer of New South Wales, Surgeon-General John White, alluded to as a substitute for Cajuput-oil in a departmental report of mine in 1853, brought before the Exhibitions of 1855, and more prominently those of 1862 and 1867, the value of this oil was recognised as a medicament of wide-reaching destiny; subsequently the hygienic effect of Eucalypts was also studied, so that, as you know, now to Eucalyptus one of the foremost places is assigned in therapeutics. But to Mr. Bosisto is due the credit of rendering the Eucalyptus-oil accessible in every hospital and pharmaceutic establishment of the globe. While giving to the production commercial dimensions, he further brought some other active principles of the Eucalyptus under notice, though these kind of trees had some renown already much earlier, Kino of E. rostrata for instance having been used with predilection in chronic diarrhœa, such as is apt to occur in tropical countries. This is not the place to enter on a disquisition of the multifarious uses, into which Eucalyptus has been drawn tentatively or permanently for medicinal application, whether as an antiseptic even for gauze-dressing, or for inhalation from vapour-atomizers; whether as a rival of an antispasmodic of old date, or as an antipyretic of recent time; whether as a hygienic factor of wide regional scope, or as a local disinfectant, because the main results thus far attained were put together, partly from a treatise by Professor Hugo Schultz, not very long ago for a special article in one of our Australian professional periodicals; still many other values have since been attributed to our Eucalypts, among the last being A. Marenski's observations on the efficacy of the oil in paralytic affections. But I would wish you as Australians to reflect what our clime might be, if instead of the salubrious Eucalyptus-forests we met through vast regions those kinds of trees, from the mouldering foliage of which various forms of malarial fever would arise, dreaded in so many other tracts of the warm zone; and it may fairly come within our notice on this occasion, that young growing Eucalypts, to us so handy here, are placed in the wards of hospitals in various places of the European Continent, to ameliorate the air and subdue contagion, quite irrespective of the cheerfulness which the foliage imparts. How easily could something similar be done anywhere here. Need I draw your attention to the vastness of the myrtaceous vegetation throughout all Australia, and in forms strongly antiseptic. Even Cook's surgeons foreshadowed ingeniously our comparatively recent

clearer discernments, by using foliage from Leptospermum for an antiscorbutic Tea, given to the sick of the crew, while the great navigator stayed in New Zealand; hence the popular name of "Tea-tree" also for so many Australian shrubs, even if not arborescent.

It is a gratifying fact, that in this city pharmacists first strove to obtain for their profession that raised and recognised status, of which it now can be proud, a movement which from here soon extended to the other Australian Colonies. Here also they established their first college. A word of recognition must be given to the enterprising chemists and drug-merchants, who, as fellow-colonists of ours, have started factories of their own, the display from some of them at the Centennial Exhibition being magnificent. The now numerous pharmaceutic societies all over the globe are within their own sphere grandly advancing the intrinsic interests of their calling, as Pharmacy is bound as a powerful auxiliary to keep pace with the quick advancement of medicine. Under such auspices, we can anticipate that the pharmaceutic gentlemen, while gradually scattering establishments of theirs over the whole Australian continent, will seize the splendid opportunities afforded them for such original researches, as can only be carried out in native fields. How would a Sonder, Rabenhorst, Kuetzing, Mitten and Boeckeler have rejoiced to win laurels on virgin soil of continental expanse, previously untrodden by civilised man! Workers from their ranks must be inspired by the glorious achievements from the time of Scheele and Chaptal to that of Oersted and Dumas, from that of Gmelin and Rose to that of Flueckiger and Attfield.

It would be an incalculable boon, if an international pharmacopœia could authoritatively be established, with weights and measures of an uniform standard, doubtless finally everywhere according to the decimal system. But to avoid more readily the occurrence of numeric errors in the writing or interpretation of figures, it might be best in prescribing, to use distinct letter-designations for the decimal proportions of grammes and litres, should these standards ever be adopted as universal. In the United States the re-issue of the Pharmacopœia is decennial; this acts as an incentive, to bring timely together all additional data, meanwhile gained, for systematic and conformous insertion. Not all Pharmacopœias are "up to the times" as regards phytographic nomenclature, so as to render it consonant with every recent discovery.

Whoever had an opportunity of seeing the prescriptions, kept with a kind of sanctity as heirlooms in old family-shrines, even only from about 150 years ago, must have been astounded at the multiplicity of the ingredients constituting some of these extraordinary compositions, which were regarded as a sort of talisman in many a household then. Never

theless, some of the modes of cure in vogue about that time in many cases may have come undeservedly into disuse, for instance the copious internal administration of olive-oil against corrosive poisons. Quite rightly the newer turn in prescribing has been towards simplification, but not that thereby in any manner a leaning to particular doctrines is to be indicated. It may be difficult or even impossible, to follow up observingly the action of any medicinal substance in conjunction with other potent remedies, possibly antagonistic to each other physiologically as well as chemically; the effect then of each single component is apt to be lost sight of, nor can its action be fully controlled, even if our knowledge of the mutual relation of the ingredients were in each case perfect.

Looking to the future, we must be afraid and therefore prepared, as maritime journeys are more and more shortening, to see sooner or later also epidemic diseases invading Australia, such as the deadly Cholera Asiatica and Typhus icterodes, of which we hitherto remained free; we will never be able to ward them off entirely, though we are bound by the best of sanitary measures and the most experienced treatment to subdue at any time their formidable outbreaks and ravages.

Diverging for a moment from the special topic, of which on this grand occasion you have made me the exponent, I would ask you all to consider, whether the principle could be extended, so thoughtfully initiated by the Leaders of this Congress, to offer from these youthful lands invitingly the hand of professional brotherhood to the vast fraternity in the older and oldest homes of progressive thought. Already on this occasion one of the Indian Dependencies of Her Majesty has accredited officially to us an able representative; this must arouse and justify a hope, that any invitations to depute medical emissaries would meet with a perhaps extensive response, when authoritatively and distinctly emanating from us for the next Congress, and when directly conveyed to all the Universities of the world. Tentatively no Council could well take at once from new colonies so bold a step; but the interests of Australia are assuming such magnitude as to direct the eyes of the whole intellectual world gradually to these far southern regions also. Doubtless it would be felt at the medical faculties anywhere, how wide a difference exists between a general invitation such as could only be made in the first instance, and a subsequent direct call to recognise and aid our honest aspirations by representative emissaries of theirs. In the latter case, we not only welcome the individual visitor, but also the public dignitary. If even only a limited number of Universities could for each of the medical gatherings in Australia set free a delegate, how would they be cheered by us, what boundless hospitalities would

be shown, how eagerly would facilities be afforded to the illustrious comers for all professional enquiries of theirs, what treasures of original knowledge and unique experiences would we gain from them, and how immensely inspiring would their appearance among us be, as the bearers of greetings from the remotest lands. And how would an over-worked Professor or a long-harassed Practitioner rejoice in the exchange for once of a northern winter with an almost continuous spring of ours in the far south, gaining new health and strength for prolonging a celebrated career. All this would not be without a hope of his gaining even professionally new knowledge locally by personal inspection, and with a likelihood of further expanding his own views by various observations in a course of travel through these colonies. Altered forms of diseases would come under review due to our clime or other local circumstances ; sanitary and hospital arrangements here, our University work and the course of preparation for it, material enrichment of Museum Collections—all these would attract attention, and also the very novelty of nature here should enchant such an intellectual stranger. We may feel quite convinced of this, that whenever in these latest colonies through our science-organisations we may approach the venerable institutions elsewhere, we would be met in a dignified spirit of kindliness, and would at all events elicit in response a graceful encouragement from many an illustrious personage ; we in turn then could arrange for representation of these colonies at gatherings, similar to ours, abroad. To us it would be a glorious beginning to connect us more closely with medical science all over the globe. What a source of new inspirations it would be, what a linking together in the chain of science !

It is an immensely honoring position, accorded to me at the late autumn of my life, to become connected with a movement, which will link together historically in the great science of medicine whatever its genius did attain or will yet achieve in this part of the world. No prouder obligation is imaginable, than that of addressing hundreds of professional gentlemen, assembled in the greatness of their cause, and worthily engaged on a mission the most sublime !

Congresses, so auspicious as this, will tend to arouse a more general interest for cultivating afresh by improved recent methods our wide fields of enquiry, with the prospect of more abundant harvests. For us, at this stage of the world's history, it is fortunate, that we live in an age, when the search for truth is not endangered as at the time of Galileo or Vesalius !

When the grace of divine Providence has endowed us with faculties and afforded us opportunities, we are bound to turn them to the best account in whatever sphere of life ; you all do it in the daily exercise of

one of the noblest and most practical of all professions; a glow of exulting feeling pervades you at each resultful instance of your action, a grateful smile greets you at each of your successes; and *that* is really your best reward.

Centuries rolled on, a new western world was opened up with all its wonders, to display new treasures also for medicine, and to increase vastly its working power; lastly, in youthful grace a new far southern world emerged from the nebular dimness, in which it had been involved since the creation's dawn, free at once to the access of the highest civilisation, open to millions on undisputed ground, and blessed by the most salubrious of all climes within the warmer zones. Centuries will roll on and on again; we cannot foresee, what even in a single decade may be accomplished; but this much we can foretell, that the successes of the world's works, in whatever direction, must always largely depend on the influence and the boons of medical science. And this also may be foretold prophetically, that the time will arrive, when whatever pertains to diseases and their remedies will have been so extensively tested in thousands of hospitals, and so specially been studied at millions of sick beds, that the uncertainties, which still so much prevail, shall all have been cleared away, and when therefore the physician and surgeon with increased trust will enter on their responsible and elevated career. And further, this we may rest assured of, that the fair fame of Australia will be sustained also by the natives of the soil on the field of medicine. As now, so also in future, no other science will have so many independent observers, so many original investigators, and withal for so high and yet so unselfish purposes all over the world.

It was fascinating to live through a great part of that century, which —to all human forethought—will ever be the grandest for main-discoveries; and so it was enchanting also to witness the brilliant development of medical knowledge, with the ready chances of rendering its successive achievements at once our own.

Most of what we know is an inheritance from the toil of other minds and the gain of former ages; we should therefore in due gratitude also strive to enrich by individual research the gifts which came to our share from former generations; and nowhere can more exalting opportunities exist for such honorable tasks, than in the free fields of a new continent, under the ægis of the British throne.

While closing the last of the sectional addresses at this great intellectual gathering, may I be allowed to offer yet a few more valedictory words, all the more so, as I can scarcely hope to meet you again. As a mere "Superstes," who has almost passed away, I might be permitted then to say more particularly to the youthful students, who toil within these solemn halls, guided by devoted preceptors, and

preparing for entering professional life, that it is the medical practitioner above all, from whom, with necessarily great natural talents and a high standard of education, is required for his career an earnest will, a due estimation of working time within the course of individual life, a well calculated plan, a methodic arrangement for what has to be effected as a connected total, an unswerving adherence to a fixed purpose, an indisturbable perseverance and a concentration of every faculty, to lead to gratifying and perhaps triumphant success; yet thereby, not to forego participation in rational sociality, measured recreation, administration of charity, and above all not thereby to sacrifice religious humility. The medical profession in its united efforts indeed largely influences the tone of society; medical science confers more worldly blessings than any other; it is the most closely interwoven of all with daily life, in all phases of human existence throughout the world; it is neither bound to nationality, nor to language, nor to creed; its codex is universal; it brings most closely into contact, whatever emanated from the cultured exercise of the human mind; indeed, its objects are sacred and transcendental!

ON THE MATERIA MEDICA AND PHARMACOLOGY OF QUEENSLAND PLANTS.

By THOS. L. BANCROFT, M.B. Edin.

Queensland ranks among the richest of countries in plants used medicinally. There are no less than 150 medicinal plants, but the majority of these are probably inert. Many are natives of Southern Asia, where almost every plant is considered to possess curative properties. There is an account of the medicinal use of a number of these given in the writings of Mr. F. M. Bailey. These plants, however, with a few exceptions, have little interest to pharmacologists.

The following four plants are more especially worthy of mention, viz.:—Abrus precatorius, the Jequirity; Mallotus Philippinensis, Kamala; Melaleuca leucadendron, Cajuput; Cissampelos Pareira, Pareira brava.

Of Solanaceous plants, there are several that have active properties, viz.:—Solanum aviculare, Nicotiana suaveolens, Datura Leichhardtii, Duboisia myoporoides, Duboisia Hopwoodii, the Pitury.

The Duboisias are remarkable as an instance of species containing different alkaloids. Duboisia myoporoides contains Hyoscine, the basis, according to Ladenburg, of the mydriatic alkaloids—Atropine, Hyoscyamine, Daturine, and Duboisine.

Duboisia Hopwoodii, the Pitury, contains a liquid volatile alkaloid "piturine," which was first separated by Staiger. It closely resembles

"nicotine," if indeed it be not identical with that substance. It was apparently proved to be nicotine by Professor Fraser and M. Petit, but Professor Liversidge, of the University of Sydney, has since examined this substance; he found that it differed from nicotine in certain reactions. It is worth mentioning that these two plants, possessing active principles so widely different, both in their chemical and physiological properties, have been so confused by scientific investigators, merely because they possessed the same generic name.

The genus Cryptocarya, of the order Laurineæ, contains a curare-acting principle. It is, I believe, an alkaloid, closely resembling Curarine. Professor Fraser has promised to experiment with this poison, so before long something definite about it may be known. There are several species of Cryptocarya in South America, and notably one, C. Guianensis.

It is Guiana where curare is obtained, and it is to the interest of the natives, who collect this substance, to keep its source secret. It seems that to inquirers, the natives always point to a Strychnos (chiefly Strychnos Guianensis—see Trin. edit. of Wittstein's "Organic Constituents of Plants"), as the tree from which they obtain the curare. Some samples of curare contain curarine, brucine, and strychnine; other samples contain only curarine, which fact seems to point to the juice of a Strychnos being added at times to enhance the poisonous nature of curare.

Of Euphorbiaceous plants, there are many that apparently contain the acrid poison of the order. The Excæcarias, of which there are several, are notable as causing sore eyes, should the juice by any means gain entrance into the eye. When striking the tree with an axe—especially E. agallocha, the milky mangrove—one is apt to be splashed. In the Gulf of Carpentaria, where E. parvifolia, the so-called gutta-percha is common, new arrivals often cut a stick of the tree, and in this way get the juice upon their hands and afterwards into their eyes; they then become for a time blind. This blindness, however, is only of short duration, leading to no after effects.

There are many species of Euphorbia; two have become notorious, viz., E. pilulifera, the asthma herb, and E. Drummondii. Why specially these two, it is hard to imagine. "Drumine," the supposed active principle of E. Drummondii, has been examined by several chemists in England, and pronounced by them to be calcium oxalate.

The bark of Croton insularis might be used as a substitute for cascarilla. The barks of Alstonia scholaris, Alstonia constricta, Sarcocephalus cordatus, the Leichhardt, and probably others, contain excellent simple bitter principles. As antiperiodics, none of these plants have any value compared with arsenic or quinine.

The gums of Eucalyptus corymbosa, E. siderophloia, E. resinifera, and many others, are good astringents, as is also the bark of Beilschmiedia obtusifolia, the Queensland sassafras. There are fifty odd species of eucalyptus in the colony, and many of these possess essential oil in their foliage more or less resembling the commercial oil of eucalyptus. Some of them contain eucalyptol, *e.g.*, E. microcorys and E. Baileyana; others, such as E. hæmastoma, contain menthol. Some possess perfumes, as E. citriodora (citron), E. Staigeriana (lemon), and E. dealbata (melissa).

In Germany, there is an idea that the oil of Eucalyptus globulus is the most useful medicinally, so this oil is manufactured there from plants grown in the south of Europe. Messrs. Schimmel state :— "That E. globulus contains 60 per cent. of eucalyptol, while E. amygdalina contains none" — hence the reason why the commercial oil is despised.

Gildemeister, in Professor Wallach's laboratory, has lately investigated these oils (*Pharm. Zeit.* August 22, p. 499). He finds: "That eucalyptol is present in considerable quantity in the E. amygdalina oil, and further confirms previous statements, that eucalyptol is identical with cineol and cajuputol."

Messrs. Schimmel are making further investigations into E. amygdalina oil. They are of opinion that Gildemeister was supplied with a mixed oil distilled from E. amygdalina, E. globulus, and probably other species (*Pharm. Journal*, October 29, 1888).

There can be no doubt that the commercial oil of eucalyptus, whether containing eucalyptol or not, is extremely valuable when vaporised with steam as an inhalation in the treatment of diphtheria. Internally it is tolerated better than turpentine, and appears to be quite as efficacious. There may be an error in regarding eucalyptol, and not terpene, as the medicinal ingredient in eucalyptus oils.

There is a mistake often made in regarding eucalyptus trees as being antimalarial. Why, it might be asked, is it then that people get ague repeatedly while living in eucalyptus forests? The error originated on account of certain malarial districts, where there were few or no trees, having been rendered non-malarial by the growth there of eucalyptus. The reason, of course, is that these quick-growing trees have dried up these localities. Other trees would have done the same. The error might be overlooked but for the fact that some persons have traded upon it, and sell preparations of eucalyptus, stating the same to cure ague.

The pseudo-bulbs of an orchid (cymbidium) are used successfully at times by bushmen to check diarrhœa. Mr. C. Hedley states "Proc. Roy. Soc., Queensland," vol. v, part I, p. 12) : "If the pseudo-bulbs of cymbidium canaliculatum are grated up and boiled, a body is produced not to be distinguished from arrowroot. Delicate children have been reared on this, when accidents have cut off from them other supplies."

Two leguminous plants are well known as being poisonous to sheep, namely, Gastrolobium grandiflorum (poison-bush), and Swainsona galegifolia (Darling-Pea). Although these plants have been often examined, both in the colonies and in Germany, no poisonous principle has ever been discovered in them. Already forty-five plants growing in the colony have acquired a reputation as being more or less poisonous to stock. These plants, with several exceptions, are probably inert. Almost any plant, under certain conditions, will poison sheep.

Erythrophlœum Laboucherii is said by Baron Von Mueller to contain erythrophlœin, the active principle of E. Guineense.

The gum of Acacia Cunninghamii makes a good adhesive mucilage; it is, however, dark in colour.

The pods of an acacia growing in the Gulf of Carpentaria district are rich in saponin. Mr. Bailey is of opinion that this is the acacia named by A. Cunningham "Acacia deliberata."

Xanthoxylum veneficum (Bailey), a small tree, rather uncommon even where I discovered it growing on the Johnstone river, contains an exceedingly poisonous principle, which however has not yet been separated. It appears not to be an alkaloid. The action it causes, when injected into warm-blooded animals, seems much like that of strychnine; yet upon frogs, it does not cause tetanus. A particle of an alcoholic extract of the bark will, if placed upon a frog's back, cause great excitement –the frog jumps violently about until it becomes, in a few minutes, flaccid. When first I examined this poison, I erroneously supposed the excitement to be tetanus.

The genus Daphnandra, of the order Monimiaceæ, is very interesting, as possessing several alkaloids of a stable and crystalline nature. In their physiological action, they resemble somewhat the Digitalis group. I have for some years now occasionally used a tincture of the bark of Daphnandra micrantha in the treatment of heart cases, apparently with good results; my patients expressed themselves as feeling much better, and the sphygmograph showed some improvement in the condition of the pulse. Daphnandra kills frogs by its action upon the heart, and kills warm-blooded animals by its paralysing effect upon the spinal cord. Although I did not anticipate that any good would result from the use of any substance having a paralysing action upon the cord, in the treatment of tetanus, yet I tried Daphnandra in a severe case of tetanus in a man. He derived no benefit therefrom, and the last two days of his life he was kept, at his own desire, under the influence of chloroform. Should a remedy ever be discovered for tetanus, I believe it will be a substance having an injurious effect upon the microbes that cause the disease, like the effect of salicine in rheumatic fever, and quinine in ague.

The genus of Laportea, tree nettles or stinging trees, so common in the jungles all over Queensland, has some interest to pharmacologists, inasmuch as after being nettled, one is reminded of the fact for several days, and in exceptional cases for weeks, whenever the nettled part is wet. Upon touching water, there is produced a sudden severe pain, it is only momentary however. If the hand be the part nettled, the secondary pain starts in the spot nettled, and runs up the arm and down the corresponding side. No explanation has ever, as far as I am aware, been given to account for the secondary pain. A juice made by pounding the green leaves in a mortar gave no decided reaction with litmus paper; it was tasteless, and when injected into frogs, had no action upon them. If the stinging hairs be carefully examined, and the tops shaved off with a razor, a few will be seen to contain a minute quantity of fluid, so small a speck is it however, that even with the microscope it is impossible to test its reaction with litmus. The juice of Colocasia macrorrhiza plays the part of the dock in England as a remedy for application to parts nettled; it however seems quite useless.

The adage, "If you gently touch a nettle, it will sting you for your pains," is not applicable to tree nettles, for in order to be stung, it is necessary to handle the leaves roughly, or brush against them with some force. The fracture of the points of the stinging hairs is quite audible, and one feels a prick when the point enters the skin; in a second or two afterwards, he is conscious of having been nettled.

I am indebted to my friend, Mr. F. M. Bailey, for his kindness in placing in my hands specimens of the two native species of Strychnos, viz., Strychnos psilosperma and Strychnos lucida. All parts of S. psilosperma are bitter, but not so bitter as strychnine. I was unable to kill frogs with this plant. S. lucida is, on the other hand, extremely bitter. So intensely and persistently bitter is this plant, that one would imagine that it was very rich in strychnine. I was astonished, however, to find that I could not tetanise frogs with it. It was not even poisonous to them. The frogs used, "Hyla cœrulea," are very susceptible to strychnine.

I had only one fruit and several leaves too small a quantity to attempt any chemical analysis.

There are many other plants interesting pharmacologically, among which may be mentioned the genera—Piper, Flindersia, Archidendron, Harpullia, Pongamia, Marlea, and Xanthium.

NOTES ON THE POISONOUS ACTION OF SPECIES OF GASTROLOBIUM AND OXYLOBIUM.

By Dr. Rosselloty, Williams River, Western Australia.

The plants reported on are known locally as (1) Heart-leaf Poison, (2) York Road Poison, (3) Narrow-leaf Poison, (4) Bloom Poison, (5) Box Poison. From the specimens sent, Baron Von Müller has identified them as (1) Gast. bilobum, (2) G. calycinum (Benth.), (3) a G. allied to G. oxylobioides and G. microcarpum, (4) G. ovalifolium, (5) Oxylobium parviflorum (Benth.)

All of these plants have a powerful narcotic action, and it is a valuable result that the species *G. Ovalifolium*, not previously recognised as poisonous, is now known to be so. The symptoms are as follows :—

(1) *Box Poison* (*Oxylobium parviflorum*). More virulent than York Road poison, but being taller in growth, is not so much eaten by sheep except when in bloom, when they seek it, and it is very fatal. *Effect on Sheep.*—Does not show its effects for from eight or ten hours after eating it. They then seem to go blind, run about much, and fall on the ground in strong convulsions. They generally have three fits before they die. *Post-mortem appearances.*—Heart gorged with blood almost to bursting. Lungs not so much congested as with York Road. Stomach and liver also much congested. Dogs eating the flesh have similar convulsions, and bite anyone they come near. Pigeons and other birds eat the seeds of all the poison-plants with impunity, but their entrails will poison cats or dogs, but not the flesh."

(2) *York Road Poison* (*Gastrolobium calycinum*, Benth.)—It takes effect on sheep within six hours of eating it. Convulsions come on in twelve hours. Sheep jump about, and muscles contract much. It seems to prevent both sheep and cattle from chewing the cud, by

affecting the first stomach. If the stomach is full before eating the poison, there is less chance of recovery. In the first stage, salt seems to be an antidote, causing them to chew the cud. *Post-mortem appearances.*—General congestion of the lungs and stomach. Inner coat of stomach easily peels off. It affects cattle similarly to sheep. Horses are affected by trembling of the muscles, loss of muscular power, swollen and drooping eyelids. Convulsions not noticed in them. The poisoned carcases, if eaten by dogs, do not affect them so much as those of animals who have died from box poison.

(3) *Heart-leaf Poison* (*G. bilobum*).—The *effects on sheep* are sleepiness and drowsiness. Acts in about the same time as box poison. Almost harmless except when in bloom or seed. Sheep eating it then seldom recover. Lambs die in about six hours. *Post-mortem appearances.*—Stomach and intestines, liver and lungs, much congested. It seems to prevent urination and defæcation. Paralysis before death.

(4) *Bloom Poison* (*G. ovalifolium*).—Exactly same effects.

(5) *Narrow-leaf Poison.*—Being less in quantity in these parts, has not been much observed.

[From these few notes, it is of course impossible to determine the exact physiological action of these poisons, but it is sufficiently evident that they all act very energetically on the nerve centres. Two of them, viz., *Box Poison* and *York Road Poison*, appear to be mainly convulsant in their action, producing symptoms somewhat similar to those caused by spinal irritants; while the other two, *Heart-leaf Poison* and *Bloom Poison*, seem to have a paralysing action on both brain and spinal cord, producing drowsiness, inability to evacuate bladder and bowels, and motor paralysis. And it is notable, that the former two are respectively a *Gastrolobium* and an *Oxylobium*, while the two latter both belong to the genus *Gastrolobium*, so that the difference in physiological action does not correspond to generic distinction.

There are several points of special interest in the symptoms produced.

(1) The length of time (six hours and upwards) which elapses before the advent of symptoms.

(2) The alleged effect of *Box Poison* in producing blindness in sheep. This may be compared with the similar action of a blue-flowering Grass-Lily, growing in the same district. It is useless to speculate as to its exact mode of production, but probably it may be due to a special selective action on the visual centre.

(3) The poisonous action on dogs of the flesh of poisoned animals, causing, in the case of Box Poison, convulsions similar to those of the poisoned sheep.

(4) The immunity possessed by pigeons and other birds eating the seeds of all the poison plants, while their "entrails," but not their flesh, are poisonous. This reminds us of the very great tolerance of opium and morphia in the same animals.

(5) The observation that *Gastrolobium ovalifolium* (*Bloom Poison*) is also poisonous, a fact hitherto unknown to botanists.

It is to be hoped that all these plants will be made the subject of precise experimental investigation by pharmacologists, for it is probable that poisons acting so powerfully on the nerve-centres will be found to possess valuable therapeutical properties.—D. G.]

BISMUTH : A CONSIDERATION OF ITS PROBABLE THERAPEUTIC POSITION.

By Thomas Dixson, M.B., C.M. Edin.

Considering the extreme frequency of the use of this metalloid in its many forms, and its undoubted value, it is astonishing to find how various the theories of its action are, how little these help us in deciding when to use it, and finally, how little of what is really known is given in the leading text books in Britain. I have, personally, long had doubts as to the validity and utility of the accepted theories in currency ten years ago, viz., that bismuth trisnitrate acted as a coating powder. A much-used modern text book (Bruce) describes its action as sedative and astringent; while the best description probably is that of the epoch-making text book of Lauder Brunton, to which we will refer presently.

The value of a theory is of course, at any time, to be estimated by its helping us to form deductions which, when applied, lead to satisfactory, or at any rate foreseen results. The less often these results tally with our deductions, the less the value of the theory. Now, it is not by any means a matter of indifference in the case of bismuth what our theory may be, for, thanks to the "mechanical coating" theory, several instances of poisoning have occurred, in some cases resulting fatally.

As regards the indefinite description, "that bismuth acts as a sedative and astringent," one can make but little use of it. If we use such terms, we must understand what is meant. Does bismuth act like the typical sedative opium, or as the typical astringent tannic acid and the salts of the metals? If we merely imply that it acts by lessening pain in some unknown way, we could class the use of a blister in pleurisy under "sedatives;" or that it lessened diarrhœa, we could class antiseptics under the heading "astringents." Such a use of terms is too loose to do anything but mischief, unless most carefully defined.

We will discuss the theories now more minutely :—

(1) The "mechanical theory," as it may be called, states that the powder formed in making the basic salts, the carbonate, and the oxide, &c., distribute themselves when taken by mouth uniformly over the stomach and intestines. Can any one conceive twenty or thirty grains of a heavy powder coating the extensive surface of the human stomach, especially when this again is covered with a coating of mucus—a body which becomes more tenacious in inflammatory states? The difficulty of maintaining this theory is the greater when we remember that bismuth powders rather by their weight tend to fall to the bottom of a cavity, and that the powder is composed of crystals. Were we dealing with mica, which forms "smooth" powders, we might have some ground for using this theory perhaps; it is inert too, and would be suitable.

(2) To compare bismuth with charcoal, as Brunton does, is not helping us much, considering there are even several theories as to the action of charcoal, and that charcoal is a bulky, gritty, chemically unacted-upon substance, of great chemical power, best shown when it is freshly burnt, and only perhaps of medical value under similar circum-

stances; in other words, a body whose action is not understood, a body as unlike bismuth, physically and chemically, as need be; and finally, a body with no clear therapeutic affinity to it whatever.

(3) Schmiedeberg's theory suggests that as bismuth basic salts readily assume the neutral form in presence of acids by dissolving in them, we have the slow characteristic action of astringency (seen in metallic salts), by which, in presence of albumen, the salt splits up the acid and base, uniting with the albumen, and so forming precipitates. This theory is not easy to disprove for the case of the stomach, but is evidently unsuitable for explaining its influence in diarrhœa, for the basic nitrate (say) would be the natural form of the salt so soon as it got to the alkaline parts of the intestine; in fact, very soon after leaving the stomach. This theory, therefore, is insufficient.

(4) The arsenoid action. This action has long been mooted, then cast aside and forgotten, till recently in Britain it is very hesitatingly and unsatisfactorily given by Brunton, who drops it for the one above. Let us hear what he says in the third Edition of his work:—"The soluble salts of bismuth, such as the citrate of bismuth and ammonium, when given in large doses (how ?), have an action like that of antimony or arsenic, and cause gastro-enteritis, with fatty degeneration of the liver. Small doses of the soluble preparations, or larger doses of sparingly soluble preparations, have a sedative effect upon the stomach, like that of minute doses of arsenic. The subnitrate is so sparingly soluble in water, that its utility in gastric catarrh is probably due to its mechanical action, like charcoal or binoxide of manganese. The carbonate is more soluble in the gastric juice than the subnitrate, and is supposed to be more powerful, and the same is true of citrate of bismuth and ammonium. My own experience leads me to prefer the less soluble subnitrate to either of the other preparations." A *resumé* of his further information is the following:—"The dose of the insoluble preparations is given as 5–20 grains, while the soluble are given as 2–4 grains. He says, that the soluble bismuth and NH_3 salt is more astringent and irritant than the insoluble salts, and is inferior to the latter in allaying irritation." Such is the essence of what our best British authority gives us. The information he gives is fragmentary perhaps, yet it is decidedly a long step towards the view now more accepted in France perhaps, than in Britain, that bismuth is essentially, pharmacologically, a member of the arsenic family, and towards the view I advocate "that its actions, therapeutically, are dependent essentially upon this affinity," a view I have for some years taught.

In discussing bismuth, it is therefore our duty to see how far it agrees with the other members of its group, and then what modifications of action characteristic of itself are distinguishable; for though arsenic and antimony essentially are related, they nevertheless have their differences; these differences are modifications or tones rather than real differences, and the differences between bismuth and antimony we will see are of a similar nature.

Let me first consider the chemical relationship of these bodies, for it gives the chief clue to our question. We have N., P., As., Sb., and Bi. (Vd. has not been studied pharmacologically, and need not be discussed here).

We find that as we rise in the series, the oxygen compounds become less and less acid, and more and more basic, also more and more stable; there is a vast difference between N_2O_5 and Bi_2O_5. To this oxidising power, Binz ascribes the action of the group pharmacologically.

As regards the salts of these metals, we notice that arsenic is a feeble base, antimony a stronger, and bismuth the strongest; that Sb. and Bi. form salts which, thrown into great excess of water, yield oxy-salts, which are insoluble in water, but more or less soluble in acid solutions. But these bodies readily enough can be got to form a kind of double salts such as tartarated antimony, by combining with an organic acid and an alkali, *e.g.*, sodiocitrate of bismuth.

Pharmacologically then, we have the oxides of the group becoming *less caustic* from N. to Bi.; they lessen metabolism, and as a consequence, apparently lower the nerve sensibility and reflex irritability, depress the heart and circulation, and after each of them, we find fatty degeneration of the liver, &c. In all these points we find a striking resemblance, in which bismuth shares to the full, provided it be got into the system, and it can be got into the system by injecting into the blood, or hypodermically, the sodiocitrate; this salt, of course, having as such no other intrinsic action such as the NH_3 and Bi salt might have.

Therapeutically, we find that arsenic and bismuth are used for somewhat similar conditions, and antimony is a sort of bridge between the two. Arsenic is used well diluted, and in *very minute doses* $\frac{1}{50}$ grain (say) for painful affections of the stomach; to get its effect, it is best given before meals. Bismuth is given for the same. In lienteric diarrhœa they both may be given similarly, and even in ordinary diarrhœa some speak of arsenic being of value, while undoubtedly bismuth is often exceedingly useful, but in what doses? very large ones.

In affections of mucous membranes more remote, we give arsenic, *e.g.*, phthisis, conjunctivitis, &c., in larger doses for this purpose. Antimony is less used, except where we wish to produce the reflex effect upon the bronchi from irritation of the stomach—an action which we will find even arsenic can produce, and bismuth itself still better. The latter is never employed for its influence upon, say the conjunctiva, simply because no one has thought of it. I may suggest that it certainly would be hard to obtain, but is quite possible from my theory. Upon the skin diseases, we know how phosphorus and arsenic can act. Antimony has not been so much used, but bismuth is thought very highly of, applied externally the only way to get it to the part. Upon the nervous system, P. and As. have been found to have somewhat similar indications.

Theoretically, this treatment of local (not too diffuse) affections of the skin by this group ought to be the best, inasmuch as the remedy is applied directly to the part. The remedy acts slowly and persistently, and has not injured the system before getting to the part affected. Where the local affection is due to a constitutional diathesis, of course arsenic or phosphorus would be the best to give.

Before I continue, I must remind you that, of course, bismuth has often other bodies present in it, but it is extremely probable that many troubles due to bismuth have been ascribable to the presence of arsenic or lead, so often contaminating it in earlier days. The essential actions of bismuth have been elicited with chemically tested pure specimens.

Comparing Sb. and Bi. we find the resemblance clearer than ever. Sb. is not so absorbable; Bi. is still less so. If we apply the chloride, &c. of Sb. to the tissues, it is a caustic—a corrosive irritant; the corresponding bismuth salts are so too. This is due to the action of the easily detached acid of course.

But give the tartarated antimony by mouth, and we get certain symptoms ending in emesis. We find that the sodio or ammoniocitrate of bismuth acts in the same way. In fact, the former has received the name of "bismuth emetic" (like our "tartar emetic"). Its action corresponds dose for dose with the Sb. salt. Now this is one direction where we, specially in Britain, have missed our mark, and explains why citrate of bismuth and ammonia is a misunderstood body. Here we need only allow ourselves to be led by our knowledge of the antimony salt, and all would be simpler. The dose of four grains seems simply far too large. It is hard to see, indeed, how it is tolerable at all in such doses in the system, and I cannot help thinking that there must be many cases of slow poisoning (I do not say death) unrecorded, where this absorbable salt was alone to blame. Of course, why As. and Sb. and Bi. say in minute doses in the stomach are sedative, and in large, irritant, we need not here discuss; but this apparently irritant and very extraordinary action on the part of our "sedative" bismuth is quite clear directly we remember its family relations, and prepares us for the subnitrate having the same.

And is bismuth trisnitrate really unabsorbed? Well I know of no experiments where there were given by the mouth small doses of the ammoniocitrate (and this salt could be easily worked with), but contrary to the tendency of the theory, I may say that we have two important facts—first, that while we cannot produce constitutional poisoning by giving the trisnitrate, no matter how large the dose given to animals, even Orfila proved that bismuth appeared in the urine (liver, spleen, &c.) of animals, and the same has been found with man. And further, when applied as a dressing to wounds several deaths have occurred, showing the characteristic signs of bismuth poisoning; as a soothing inert insoluble powder acting by forming a sheathing, the bismuth could not possibly poison; but if we drop this theory and remember that a very small amount absorbed of any member of this group will produce toxic signs, and that bismuth can be absorbed under conditions not fully understood, we at once are on our guard; so too Bricka and Lyirbal and Lazonsky have found bismuth in various secretions.

To understand bismuth, whether used for the intestines or the skin, as compared with As. (as the type), we must think of iodine and iodoform and iodol. The chief active body in each of these is the iodine; yet for say an ulcer, the iodoform is incomparably better than iodine, for the first would simply exert its action with, I might say, explosive energy: the latter giving of its iodine slowly and persistently, affords the same influence that the continuous slow evolution say of iodine vapor might have—gentle, yet firm in action. Now, bismuth trisnitrate is really, as seen by its appearance in the urine, slowly given off in the intestine in a soluble form (not yet understood), perhaps never in sufficient amount to be poisonous to the system, yet from the very potency of the members of the series, quite sufficiently to exert a powerful effect locally.

The bulk of a bismuth salt becomes combined with the H_2S in the intestine, and appears as the sulphide, this fact explaining why the bismuth does not get into the body in quantity sufficient to cause the symptoms of poisoning, which are very striking, in so far as they differ from the other members of the group, by one set of appearances, viz., blackening with ulceration. We could in fact imagine that we had a case of *As.* poisoning, with strange blackening of those parts of the intestinal canal where H_2S is given off. We have the nausea, vomiting, diarrhœa with tenesmus, uncertain movements, tetanic spasms, emaciation, albuminuria, granular casts, and death in paralysis; but there is stomatitis, with swelling and ulceration of the mouth, as well as of the colon. The blackening is seen best at the edge of the gums and in the colon, and ends readily in ulceration. The explanation is simply this:—Bismuth, coming from the blood, meets the sulphuretted hydrogen, which has permeated slightly into the tissues, and becomes deposited as B_2S_3 in the capillaries, blocking them, and so causing necrosis and ulcers.

In acute poisoning we see, as in *As.*, clonic and tonic spasms, ending in death in a spasm, the blood pressure falling through paralysis of the centres for the vascular nerves, and through weakening of the heart's action (paralysis of the motor ganglia in the heart).

Where are we to place the citrate, carbonate, and oxide of bismuth? Well, these would be even more soluble in the acid of the stomach than the subnitrate; this acidity, we know, is very variable, especially intense in catarrhal states, and thus we get an extremely uncertain energy of these salts. The trisnitrate is more suitable therefore, simply as being less soluble, or it may be better to use a substance which is not dependent at all on the factor of acidity, viz., *As.*; we give our dose of this, and can graduate it with certainty. When we wish to treat intestinal affections, we must choose a body which will get to the intestine, and hence bismuth trisnitrate is preferable. In the stomach, the trisnitrate is dissolved probably by the acid; and in the intestine, probably by the alkaline salts forming double salts. From this we can see that, especially in the stomach, we must be prepared for the subnitrate even showing irritant symptoms through dissolving in excess in the acid of the stomach, and so getting into an active state. I think then, we may deduce that bismuth is "arsenic with its wings clipped;" that where arsenic can be used, it is better to use it, as being far easier to graduate the dose of; but when we wish the arsenical effect to be continuous, or we wish it to get the arsenical effect in the intestine, bismuth will supply the desideratum best.

A NOTE ON DRUMINE: IS THERE SUCH A BODY?

By Thomas Dixson, M.B., C.M. Edin.

Euphorbia Drummondii.

In seeking the answer to the question of the existence of an alkaloid in the above, I may state that the plant was sent me by Mr. Bauerley, the well-known collector, and was thus genuine.

The first experiment of injecting hypodermically a large quantity of a strong solution of the carefully dried and filtered extract of the herb, with about 60 per cent. absolute alcohol and water, was negative in the case of the frog and guinea pig.

In seeking signs of an alkaloid, I took an infusion of four ounces of the herb, obtained by weakly acidulating the water with acetic acid. This was filtered from the herb next morning, and treated with neutral acetate of lead, and then, after filtering, with basic acetate. The precipitates were washed, and then carefully had their lead removed by sulphuretted hydrogen. This was done to the original filtrate also. All the fluids were carefully dried at a low temperature of about 150°, but in no case did the solutions give any trace of an alkaloid with phosphomolybdic acid, &c.

Finally, the search was made for drumine, as isolated by Dr. Reid. He suggested, in his paper in the *Australasian Medical Gazette*, to extract the plant with a weak acid solution. This I did; then filtered, precipitated with ammonia, washed the precipitate with weak ammonia water; re-dissolved it in weak hydrochloric acid, passed the solution through charcoal, and thus obtained a clear colourless fluid. Ammonia added produced a copious flocculent precipitate, which was filtered from the fluid, and carefully dried. Examined microscopically, it showed crystals according with Dr. Reid's description closely. Some were placed on a platinum pan; it darkened considerably, but left after heating in a red heat, a large amount of a white ash, soluble in HCl. The original powder was soluble in strong hydrochloric acid, not in acetic acid, and effervesced without blackening with H_2SO_4, leaving a white precipitate. I could not find that watery alcohol, chloroform, or ether dissolved it at all, though of course hydrochloric acid did.

Thus the substance was chiefly oxalate of lime, possibly only that body. I did not trouble to see if part of it were phosphate of lime, as the question was as to the presence of drumine.

ON THE DOSAGE OF IODIDE OF POTASSIUM, WITH ESPECIAL REFERENCE TO THE TREATMENT OF PSORIASIS.

By William M. Stenhouse, M.D., C.M. Glas.

Honorary Physician, Dunedin Hospital.

In the *British Medical Journal* of January 7, 1888, there appeared a leading article on the treatment of psoriasis by heroic doses of iodide of potassium, as recommended by the Norwegian physicians, Dr. Greve and Dr. C. Boeck, and carried into exhaustive trial by Dr. Haslund.

When this article came under my notice, it so happened that I was treating a case of inveterate and very chronic psoriasis, with but indifferent success. It is true that the affection yielded readily to local treatment, especially to the application of chrysophanic acid, but no

sooner was the treatment suspended, than the disease returned in all its virulence. The internal exhibition of drugs appeared after a year's patient trial to exercise no influence whatever upon the disease, although arsenic, tar, iodide of potassium, chrysophanic acid, iodoform, and sulphide of calcium had all been put to a fair trial—the arsenic itself being pushed to the extreme limit of toleration. Of all these drugs, the potassium salt alone was thought to have had some controlling effect, although this was difficult to decide, local treatment having been carried on simultaneously. But there was no doubt about this fact, that the iodide had relieved my patient of dyspeptic symptoms from which she had long suffered, and which are so often associated with psoriasis. The largest dose administered was thirty grains a day in ten-grain doses.

Having read the article in question, in which doses of from thirty to fifty grammes in a day were said to have been administered successfully, it occurred to me that the case I was then treating was a favourable one for testing the curative power of the drug when given in enormous doses, and the tolerance of the human subject for such doses.

In view of the warning contained in the last sentence of the editorial, I determined to proceed warily, and not to begin the treatment until I had fully explained to the patient and her father the enormous doses I proposed to prescribe, and the inconveniences and risks the treatment would entail. Both the young lady and her father agreed to leave the case in my hands, and it only remained for me to carry out the treatment so as to subject my patient to as little danger as possible. Here it may be as well to explain that the patient was twenty years old. and had suffered from general psoriasis—the face and head alone escaping—of a severe type since her fourth or fifth year, and that she had been frequently under severe and prolonged treatment without receiving permanent relief. She was of a full habit, and with excellent general health, her only complaint being slight dyspeptic troubles, and she had also a marked tendency to coryza.

The plan I adopted was to begin with a moderate dose and increase it gradually week by week until the disease was found to yield to the remedy, or the limit of my patient's tolerance of the drug was reached.

Accordingly on March 8, 1888, she began to take thirty grains three times a day.

On the 24th I saw her next, and found that she was able to take the dose with perfect freedom, and accordingly it was increased to sixty grains three times a day. I saw her next on April 5, and now I found a considerable change in her condition. The psoriasis was untouched, but her pulse had become very rapid, 120 in repose, and much faster after a little exertion, and she had lost flesh to the extent of seven or eight pounds at least. She also complained that her strength was gone, and that she had no inclination to do anything but only to rest. There was no headache, no coryza, no conjunctivitis, and on the other hand she had lost her dyspepsia.

As she was still willing to persevere, I resolved to continue the same dose of iodide, 120 grains per diem, but to add to each dose five grains of tartarated iron, and three minims of tincture of strophanthus, and I also enjoined her to confine herself to the sofa. I did not see her again till April 23, but had frequently heard of her in the interval as going on all right. On this visit, I found she was more tolerant of the drug than

she had been. Her pulse was still quick and frequent, small and soft, showing an absence of arterial tension, but it only counted 100 as compared with 120 on my former visit. There was no further falling off in flesh, although she had lost a good deal of her normal stoutness, with which effect she was very well pleased, and she did not complain so much of want of strength. On inquiry, it was found that the drug had exercised no influence on her uterine functions, which were going on regularly. Her appetite also remained good, and she was quite free from dyspepsia. The dose she was now taking was 150 grains three times a day, which I told her to increase to 180 grains, which she was the more inclined to do, as the disease was visibly yielding.

On May 15, the dose was increased to 210 grains three times a day. I then saw her on the 19th, and found her quite tolerant of the medicine, and greatly improved in respect of the psoriasis, which was fast disappearing. To continue the same dose till my next visit. Saw her again on June 2, found her still improving, although she felt weak and little inclined for exertion. To continue the same dose until the skin was quite clean. Saw her again on June 13, and found her well. The only trace of the affection was to be found on the knees and elbows, on which were still a few thin scales. The skin of the rest of the limbs and the body was soft and white. I now resolved to reduce the dose in the same manner as it was increased, but more rapidly. I therefore now ordered 150 grains three times a day, and at the same time prescribed an ointment of iodide of potassium and lanolin, in the proportion of one part of the former to four of the latter, with which she was instructed to inunctuate her knees and elbows.

On June 28, the dose was still further diminished, the whole of her body being now entirely free from her reluctant foe. On July 16, the dose was down to ninety grains three times a day, the patient keeping free from disease. On August 3, the drug was discontinued, there being still a trace of the disease on the elbows and knees.

On August 23, I saw her again, and found indications of a return of the psoriasis. She expressed herself as feeling better than she had done for years, having lost all her dyspepsia, and her tendency to corpulence. Her pulse was 70, strong and equable; both sounds of the heart clear and full, and she expressed herself as feeling equal to any exertion.

The whole quantity of the iodide used between March 8 and August 3 amounted to 100 ounces. Its influence over the psoriasis did not appear until the dose reached 360 grains daily, in three doses of 120 grains each. Thereafter, the disease rapidly disappeared.

The importance of the case seems to lie more in the largeness of the doses employed, than in the ultimate effects of the treatment. The effects of the treatment proved that iodide of potassium in excessive doses succeeded where ordinary medicinal doses had entirely failed. It also proved that such doses can be administered with safety, although not without considerable inconvenience, as it was quite impossible for my patient, when the dose had reached 120 grains a day, to use any exertion. It would therefore seem that, in employing the drug thus heroically, it will be necessary to enjoin strict caution upon our patients, confining them to their room, and as much as possible to a horizontal attitude. Also, owing to the marked effect of the largest doses in weakening the action of the heart, and in producing an anæmic condition

of the blood, the exhibition along with the iodide of some heart tonic, as digitalis, strophanthus, or convallaria, with iron, would seem to be indicated. In the case now under notice, the administration of five grains of tartarated iron and five minims of tincture of strophanthus had the happiest effect upon the general condition of the patient, and it is doubtful if without these it would have been possible to have pushed the iodide to the extreme dose given, or to have continued it for the requisite period.

Another lesson to be learned from this case is, that the supervention of iodism seems to belong to small doses or to an early stage only of the administration of iodide of potassium. For a few days my patient complained of slight headache--frontal pain--and also of some coryza, but these symptoms quickly passed off, and never troubled her again. There was on the other hand no gastric irritation produced, which has been set down by some observers as one of the first symptoms of iodic intoxication ; on the contrary, as we have seen, there was marked relief, nay, up to the present, complete cure of chronic dyspeptic troubles. A second train of symptoms belonging to the nervous system, and which have been described as a form of iodism, as neuralgia, ringing in the ears, convulsive movements, disturbed intelligence, ophthalmia, salivation, vomiting, polyuria, and cutaneous eruptions, was conspicuously absent. Neither was there anything like atrophy of the mamma or of the ovaries, if we are to judge of the latter by the free continuance of the catamenia.

Two further questions of an important and practical nature would seem to arise out of this case. If it is necessary in a case of psoriasis to give doses of from 300 to 600 grains daily of iodide of potassium before the disease is reached, is it not likely that in many other diseases the profession has failed to procure the benefits of this drug, owing to the smallness of the doses administered? In such an intractable disease as chronic interstitial pneumonia, I have lately seen marked benefit from large doses of iodide combined with cinchona ; formerly I used to order only five grains in such cases, lately I have given thirty with advantage. The second question is this ; when we find a disease yielding to heroic doses of iodide of potassium, is it not presumptive evidence of a remote syphilitic origin? Viewed in this light, future research may show that all cases of psoriasis spring from remote syphilis.

SOME EVIDENCE ON THE EFFICACY OF CHIAN TURPENTINE IN CANCER.

By H. E. Astles, M.D., F.R.C.P. Ed.

Physician to Out-patients at the Melbourne Hospital.

After a short historical sketch, Dr. Astles proceeded :—I now bring before your notice two cases of my own, which I think are of interest, not only because a sufficient time has elapsed to enable me to say that the patients are cured, but also from the fact that these cases were seen by others, and, moreover, by men holding a prominent position in the profession :—

On January 17, 1884, a lady, about 34 years of age, was brought to me for an opinion upon her case. She had formerly been a patient of

mine, but had only required my services at her confinements, and advice occasionally for little functional ailments. She stated that during my absence in Europe she had been treated by the gentleman who had taken my practice in Adelaide for an offensive discharge from the womb, with frequent hæmorrhage and much pain: that Mr. Corbin had seen her in consultation, and both doctors were agreed that the disease was cancer. I was able to contrast her then anæmic and cachectic appearance with her previous healthy look. Upon examination I found the os somewhat dilated, and a fungoid cancerous growth involving it and the posterior portion of cervix. The diseased surface, where it was not bleeding, had an ash-colored appearance. As the mobility of the uterus was considerably affected, there was probably more than the epithelial form of mischief.

After taking chian turpentine for a month, the pain, which had been very severe at night, abated, the discharge lessened and lost its offensive character. She continued the treatment up to July, when I found the uterus was comparatively free. The blood and discharge had stopped, and a healthy mucous membrane had replaced the cancerous growth. Her old healthy look had regained its appearance, and she had increased in weight.

My patient then left Adelaide to rejoin her husband at Broken Hill. About twelve months after this she became pregnant, and in due course gave birth to a healthy child. A few months back I received a letter from her husband, who stated that his wife continued to enjoy good health.

In January 1887, a young man, about 28 years of age, a clerk in a wholesale druggist's, consulted me for a growth at the back of the tongue. It was conical in shape, and in circumference as large as a filbert nut. It was situated more to the left than to the right of the mesial line, at the base of the tongue. It had given him but little inconvenience, but had slightly altered the character of his voice. From the patient's age, healthy look, well-nourished condition, and absence of glandular enlargement, a hope was entertained that the mischief was not malignant.

On February 15, Dr. Gardner saw him with me, when it was decided that it should be removed by the galvanic ecraseur, which he did on the 18th. Two days after the operation, a fungoid growth sprang up. I then placed him on chian turpentine. Ten days after the operation, it was larger than ever. I had by this time received, through Dr. Gardner, a microscopic section of the part removed, which had been examined by Professor Watson, of the Adelaide University, and pronounced by him to be epithelial cancer. At this stage Dr. Gardner advised the removal of the entire tongue, as the only chance open to him. The patient refused to submit to any further operation, and asked to see Dr. Davies Thomas in consultation, who concurred in the opinion that it was malignant, and thought that it must come to extirpation. I put the case fairly before the patient in writing, telling him I promised nothing as a result of the chian turpentine treatment, merely that it was the only drug that offered any chance of success. He decided to go home to England to see again, as he said, his parents. By the end of March there was an undoubted diminution of the growth. In April he left for England, taking with him a sufficient supply of the medicine

to last the voyage. I received a letter from him in England stating that he was nearly well. Professor Clay, who had seen him, also wrote to me, saying that he had progressed admirably. In November last I wrote to Adelaide asking if anything had lately been heard of him, and received the reply that a fellow clerk of his had just got a letter from England saying that he was in splendid health, and weighed 12½ stone, which was considerably more than he did in Adelaide.

I have been treating for the last two months at the Melbourne Hospital an out-patient, a woman about 50 years of age, with scirrhus of the cervix. She has certainly benefited by the chian turpentine treatment, and at a later date I hope to publish the particulars of her case.

Looking over the recorded cases of success, one naturally asks the question, how is it there are so many failures? Might it not be answered, that we must not expect cures where the destructive process was extended beyond all possible limits of recovery. As Professor Clay says:—"Chian turpentine must not be expected to build up a new uterus." And we must remember that, from the extreme scarcity of the drug, an impure article is constantly sold, said to be made up largely of resin, Canada balsam, and the essential oils of fennel and juniper. What good results could be expected from the administration of such a compound? Also, that it chiefly seems to be in the epithelial form of the disease that we must look for success.

In this paper there is no attempt at more than the mere narration of facts; for surely every instance of a successful case, among the many who pay the death penalty of this dire disease, should act as a further inducement to the profession at large, to continue their investigations of a form of treatment which has proved beneficial in other hands than those of Professor Clay.

NOTES ON THE EXTERNAL USE OF SULPHATE OF IRON.

By Colin Henderson, M.A., M.D.

Castlemaine Hospital.

I wish to bring into notice a remedy which is not new, but which I have applied in a new manner for many years, and have found of great use in the external treatment of diseases of certain kinds, and in surgical injuries. The substance to which I allude—sulphate of iron in granular crystals—was first recommended as a topical remedy by Velpeau, to whom I admit I am indebted for the idea of using it, not only in erysipelas, but also in other diseases of a similar nature. I use it in a two-fold form of application. The first I have called the "glyceride of iron," and is made by dissolving one drachm of the sulphate in just sufficient boiling water, and then adding to that one ounce of glycerine. "The lotion" is one ounce of this glyceride to five and a half ounces

each of chloroform water and of camphor water. Of course, either the glyceride or the lotion can be made stronger, but the strength which I have named has seemed to be sufficient.

I have used the glyceride with excellent results in the following diseases in which the skin is affected, painting the part thoroughly, covering it with muslin, which is also painted over and kept moist with the application, and allowed to remain undisturbed for forty-eight hours. In erysipelas, and in its minor form erythema, the effect is most satisfactory. The pain is relieved, the inflammation ceases to spread, and desquamation rapidly follows, leaving the skin underneath quite sound.

In cellulitis, the same result is obtained, if the application be made early. In whitlow, and in those analogous cases commonly called poisoned finger, I have given great relief and a speedy cure, by wrapping the part in hot water lint, soaking this well with the glyceride, and covering it with oil-silk. In chronic eczema, and in eczema impetiginodes, it acts in the same way as in erysipelas, quickly producing desquamation and a sound skin.

To its excellent effect in diphtheria, I wish to call particular attention. A mop of cotton wool, soaked in the glyceride, and used as a swab to the throat, two or three times a day, is the best topical application I have yet found. The membrane speedily ceases to form, and with its disappearance there is always a marked improvement in the patient. I do not recollect a single fatal case, in which this treatment has been adopted sufficiently early.

"The lotion" I use in all cases of wounds and bruises, which are likely to be followed by inflammatory action, such as violent cuts and stabs, compound dislocations and fractures. Muslin, wetted or irrigated with the drip bottle, is kept on the affected part till all chance of inflammation is past. The same plan I have followed with good effect in burns of the first degree. It decidedly relieves pain, subdues inflammation, and acts antiseptically. I am of opinion that its action as an antiseptic is the explanation and foundation of its virtues. It is said to have a microbicide power of 1 in 110, while carbolic acid is stated to have one only of 1 in 30. It is employed by the vine-dresser to destroy "oidium," and by the farmer for "smut" in wheat, while the Health Officer recommends it for destroying typhoid germs. It prevents low cell growth, whether that be vegetable or animal; hence, it would be useful, I believe, in forms of tinea—a disease in which I have not yet tried it. In all these cases, almost of daily occurrence, in which I have made use of it, I am quite satisfied that it is a remedy of high value. It possesses other advantages besides—it is cheap for hospital use, it is non-poisonous, it is odourless, and its taste as a glyceride is not unpleasant—no small advantage to children having their throats swabbed. It is a styptic of some power, and although applied in a liquid form to incised wounds, does not prevent healing by first intention. In any case, in the way in which I apply it, it does not cause any pain.

It has one disadvantage—it stains sheets, towels, and linen, but the marks may be removed by a hot solution of oxalic acid, or binoxalate of potash, well rubbed into the fabric (ʒj ad Oj). This drawback of course does not affect its therapeutical character.

NOTES ON TWO CASES OF SNAKE-BITE.

By J. S. Thwaites, M.B. Melb.

J. B., was bitten by a tiger snake on the back of the right hand, about 12.30 p.m. on November 25th. Had some difficulty in shaking the snake off. He killed the snake and then tied a piece of rag round the wrist, and made a small incision in the skin over the bite, and only a drop or two of blood came away. He then walked a mile to the nearest neighbour, and by that time the poison had affected both his gait and speech, and the neighbour thought he had been drinking. A piece was then cut out (at least half an hour after bite), and whisky administered. They then started to drive him down a distance of about thirty miles, and sent a messenger on to warn me. I met him about four miles from my residence, at 5.30 p.m. He had to be held on the seat of the buggy, and had not been able to speak for some time, although he had had his whiskers pulled, and been pinched. His pulse was very weak and rapid; pupils dilated greatly, and face very pale. I got into the buggy and injected 10 m. liq. strychniæ. In a few minutes he would speak when spoken to, and his pulse improved greatly, and he could walk with some assistance, but legs very shaky. Removed the ligature of dress stuff which had been tied very loosely, and had evidently been useless, as the hand was hardly swollen at all, and I could put my finger under it easily. He kept up fairly well till 8.15 p.m., when he collapsed altogether; I then injected 20 m. liq. strychniæ, which brought him round in a short time; but he collapsed altogether again at 9.15 p.m., when I injected 15 m. liq. strychniæ, and in a few minutes after he got slight twitchings about the face and neck, and from that time he kept on improving. I gave stimulants occasionally until morning, when he felt quite well, but a little weak and very sleepy; did not allow him to go to sleep till evening. Patient had been dosed pretty considerably with whisky on the way down to keep him going.

A. D., aged 13, was bitten about 5.30 p.m., on December 14th, by a tiger snake, on the outside of left leg, midway between the knee and ankle. The snake hung on for some time. She tied her garter tight above the knee and ran home, a distance of three-quarters of a mile. A large piece was then cut out, and another good firm ligature put on above the knee. Whisky was administered freely, but she vomited several times.

I first saw her at 10.20 p.m. and she was quite pulseless at wrists, cold as a stone, and I could not detect her breathing; could just feel heart fluttering, pupils insensible to light. Injected 17 m. liq. strychniæ, and applied artificial heat. In about two minutes she sighed once or twice, and then began to breathe in a jerky manner. In about ten minutes, on pulling her hair, she opened her eyes and looked round, but could not recognise anyone, and pupils acted to stimulus of light. In a short time she would speak when spoken to, but could not see at any distance. She kept on improving, and her sight gradually returned, and in about four or five hours seemed quite well, but rather weak. I gave small doses of stimulants occasionally till morning, and did not let her go to sleep till next evening.

I noticed particularly in this case, that when the strychnine began to counteract the snake poison, the alcohol she had taken began to act, and she became semi-intoxicated, talking loudly, swearing, &c.; this gradually wore off, and she then became very quiet. She is naturally very timid and reserved.

After the reading of the foregoing paper, Dr. AUGUSTUS MUELLER added a few remarks.

NOTES ON SOME INDIAN DRUGS, WITH EXHIBITS.

By Dr. KIRTIKAR.

With a view to simplify the arrangement of the preparations, I shall describe them according to their natural orders, with their native names as known in Western India.

N.O. RANUNCULACEÆ.

(1) *Aconitum heterophyllum* (*Atiwish*).—The preparation exhibited is a powder of the tubers. It is a popular remedy with the native physicians in debility after malarial fevers. Its special value lies in its being a non-poisonous preparation containing an alkaloid called *atisine*, which, though bitter, is only a harmless tonic. Aconitine is entirely absent from this powder, although the analysis of Wassowicz shews that there is aconitic acid in the root, along with a mixture of oleic, palmitic, and stearic glycerides, cane sugar, vegetable mucilage, &c. (Dymock). As an anti-periodic, even when the fever is on, it is given in doses of from twenty to thirty grains of the powdered root thrice daily. It is given as a tonic in doses of five to ten grains, thrice daily.

(2) *Coptis teeta* (*Mamirâ*).—The preparation exhibited is a powder of the dried rhizome. It owes its value to the presence of berberine in a soluble condition, and has been used as an intestinal tonic, especially where there is a tendency to a chronic catarrh of the bowels. The dose of the powdered rhizome is from five to ten grains thrice daily.

(3) *Thalicratum foliolosum* (*Pilijari*).—The preparation exhibited is the powdered root. Dr. Dymock, of Bombay, has administered it in the form of a tincture; and he finds, from his experience in the European General Hospital, that it is "a good bitter tonic, comparable with gentian." It is known to the native druggists of Bombay under the name of *Piaranga*, and owes its therapeutic property to berberine, which is found in large quantity in the roots, and is readily soluble therefrom in water. It gives a tone to the bowels, and improves the appetite during convalescence from malarial fever. Dose—Five grains of the powder thrice daily. There is also a watery extract made of the root, which may be given in doses of two grains thrice daily.

N.O. MENISPERMACEÆ.

(4) *Tinospora cordifolia* (*Gulwel* or *Garola*).—The preparation exhibited is a powder of the stem which may be used in making

an infusion in the proportion of one ounce of the powder to ten fluid ounces of *cold* water. The medicinal value of the plant is due to a small quantity of berberine. It is used as an alterative and tonic, and has enjoyed the reputation among the ancient Hindoo writers of being an aphrodisiac, but as the drug is never prescribed alone as an aphrodisiac, its reputation is of a doubtful nature. Dose—One to three ounces of the infusion. There is a starch obtained from the roots and stems of this plant which goes under the name of *Gulweliche Satwa* (the starch of *Gulwel*), which is very similar to arrowroot in appearance and effect. It answers not only as a remedial medicinal agent in chronic diarrhœa and some forms of obstinate chronic dysentery, but is also a valuable nutrient when there is intestinal irritability and inability to digest any kind of food. I have myself had experience of the usefulness of this starch. Dr. Dymock says, through not having been washed, the starch has been found to retain some of the bitterness of the plant. I have tasted the starch myself and have not found it bitter to any appreciable degree, probably from the fact that my specimen was different, but I have no doubt that the starch has some medicinal property in it from the minute traces of berberine which the plant contains. I think also that this drug is useful where there is an acid diarrhœa, due to acidity of the intestinal canal or acid dyspepsia. It is useful in relieving the symptoms of rheumatism. There is another preparation of this plant—the succus prepared from the fresh plant. It acts as a powerful diuretic. It is prescribed by the ancient Hindoos in gonorrhœa, with advantage. Considering that in the earlier stages of gonorrhœa we now try to reduce the acidity of the urine by alkaline mixtures, it is probable that this drug acts by reducing the acidity of the urine in gonorrhœa. The dose of the succus is from one to two drachms in water, milk, or honey, thrice daily.

(5) *Cocculus villosus* (variously named *Vasanvel*. *Tâurel*, *Tâni*, *or Pârvel*).—There are two preparations of this plant :—(*a*) A liquid extract obtained from the root, and (*b*) A syrup prepared from the leaves. It is a common hedge plant in Western India, especially in the Koukan, where it is generally used as a refrigerant in febrile diseases, and also as a gentle laxative. It has also been extensively used as an alterative in chronic rheumatic, and venereal diseases. Dose of the syrup—One to two drachms in water or goat's milk. Dose of the liquid extract—A drachm in water or goat's milk, thrice daily.

N.O. Capparideæ.

(6) *Cleome viscosa* (*Kânphuti*).—The preparation exhibited is an oil obtained from the seeds. The plant has a great reputation as a remedy for chronic otorrhœa. Its action is chiefly antiseptic, as it contains a powerful volatile principle not unlike in smell to that of the mustard. This active principle has besides stimulating properties. The plant is highly viscous in every part, and is covered over with hairs, which are capped with sticky glands, and smell powerfully. The plant was known to the ancient Hindus as "Adityabhakta," as its delicate flowers of rich golden hue are seen at their best at sunrise, and hence called "Devoted to the Sun."

N.O. Pittosporeæ.

(7) *Pittosporum floribundum* (*Yekadi*).—The preparation exhibited is a tincture. It contains a volatile oil, which is said to act as an antiseptic and stumulant to the mucous membrane of the bronchi. The dose of the preparation is a drachm and a half, thrice daily, in water or honey.

N.O. Guttiferæ.

(8) *Garcinia mangostan* (*Mangustân*).—There are two preparations—a powder and an extract (liquid), useful in chronic diarrhœa and chronic dysentery. The value of these preparations lies in the yellow resin which the rind of the fruit contains—a characteristic of the fruits of the Guttifers. The resin acts like all other resins, as a stimulant to the mucous membrane of the intestinal canal. I am not sure whether the crystallisable substance, *mangostine*, which Schmidt has obtained from the rind, has any particular therapeutic property. It is worthy of a trial, as the preparations are largely used by the Natives of Western India in chronic cases of intestinal catarrh. Waitz recommends a decoction of the powdered rind as an external astringent application. I have no doubt that the resin adds to the value of this local remedy, by mechanically constricting the parts gently—an effect very often produced by uniform light bandaging.

(9) *Calophyllum inophyllum* (*Undi*).—The preparation exhibited is an oil from the seeds. It is known in Ceylon as *Domba*, and used for burning. It make a good embrocation in chronic rheumatic arthritis. It has a slightly stimulant action on the skin.

N.O. Malvaceæ.

(10) *Adansonia digitata* (*Gorakh-chinch*).—The preparation exhibited is an extract prepared from the bark. Dose—About thirty to forty grains a day, in small doses, every third or fourth hour, in intermittent fevers. The fruit pulp is acid, and makes a very pleasant refrigerating drink. When unripe, the fruit pulp is mucilaginous, but as it gets ripe, it assumes the appearance of dry pith, containing dry powdery acid starch-like stuff, enclosed in bundles of fibre, and surrounding the seeds. Walz has extracted an active principle from the bark, called *Adansonin*. The pulp is an astringent in diarrhœa, like gallic acid.

N.O. Rutaceæ.

(11) *Toddulea aculeata* (*Jangli Kâli mirchi*).—The powder is obtained from the root. It has been recommended by Dr. Bidie, of Madras, as a bitter tonic in debility, after malarial fevers, and in convalescence from exhausting diseases. I have tried it in the malarial cachexia of fevers, and find that it acts as a good stomachic tonic, improving the appetite, and aiding digestion. An infusion of the root powder, in the proportion of an ounce to ten fluid ounces of boiling water, makes a capital preparation. Dose—One to two ounces twice or thrice daily. Four years ago, I obtained a few pounds of the root from Dr. Dymock, and tried them with great advantage. The root contains a bitter principle, the exact nature of which is yet unknown. It was once known in Europe

under the name of Lopez-root, as a remedy for diarrhœa, probably from the large quantities of yellow resin which its vascular and cortical systems contain. "The bark," says Dr. Dymock, "is remarkable for its large cells, filled with resin and essential oil.

(12) *Ægle marmelos* (*Belphal*).—The preparation exhibited is a preserve of the fruits in sugar. It will be observed that the specimen is clear; there is no trace of muddiness, indicating fermentation. The slices of fruit are solid, succulent, and not jagged. The latter condition occurs in fruit that is preserved when it is ripe. It is worthy of remark, that nearly all the English and even Indian preparations of bael are made when the fruit is ripe. This is a mistake. When the fruit begins to get ripe, and sugar appears in the pulp, the medicinal value of the fruit is reduced, if not lost altogether. The fruit should be unripe for preserve. In this state, there is round the small seed a mass of mucilage, which is a great agent in allaying irritation in the catarrhal inflammations of the intestines. The native physicians, especially the celebrated Vaidya Prabhuram Jivauram of Bombay, a venerable man learned in ancient Hindu medicine, and not unwilling to profit himself by the advanced researches of European therapeutics, insist, in their preparation of the preserve, on using the fruit quite unripe, when the rind is green. The unripe fruit alone is highly astringent. The ripe fruit, on the other hand, is a mild laxative. This must be remembered if the preserve is to be used for the one or the other purpose. It is a common household remedy in Western India, as effective as it is handy, especially where there is a tinge of scurvy in the patient.

N.O. LEGUMINOSÆ.

(13) *Pongamia glabra* (*Karanjâ*).—The oil exhibited is pressed out of seeds. It is an exceedingly useful oil in cutaneous eruptions of the inflammatory type—as, for instance, in chronic eczema after the "weeping" stage. It is an emollient of the best kind, and I have used it with or without oxide of zinc with great benefit. It is used in pityriasis and scabies, but I am not sure of its properties as a parasiticide.

(14) *Bauhinia parviflora* (a variety of *Kânchan*).—The preparation is a kino, or dried extract obtained from the bark. Dose—5 to 10 grains in dysentery and diarrhœa of a chronic nature. I have never used it myself.

N.O. LYTHRACEÆ.

(15) *Ammania baccifera* or *A. vesicatoria* (*Agyâ*).—There is a liquor from the leaves of this strange plant which, as its name indicates, is "fiery"—quite a substitute for the Spanish *blistering* fly. Roxburgh first introduced it into the European world. It blisters the skin, if the ethereal tincture is used as recommended by Dr. Dymock, "rapidly, effectually, and without causing more pain than the liquor epispasticus of the British Pharmacopœia." Dr. Bholanath Bose gives it internally in chronic enlargement of spleen in the shape of juice of leaves; but as may be supposed from its vesicating effect on the skin, the leaves are extremely acrid, and as a consequence must, and do, produce gastric irritation and positive pain.

(16) *Lawsonia alba* (*Mendi* or *Henna*).—The preparation exhibited is an ointment made from the leaves. I do not know if this drug has any therapeutic value. The natives of India, especially the Mahomedan males and females, use the leaves to dye their hair, hands, feet, and nails. The leaves are bruised with lemon juice, and put on the parts to be dyed overnight, and sometimes for forty-eight hours. A rich scarlet staining of the parts is obtained. The dye is produced by the action of the acid of the lemon on a particular kind of tannin which the leaves contain.

N.O. Myrtaceæ.

(17) *Eugenia jambulana* (*Jâmbul*).—The following preparations are exhibited :—

(*a*) Powder obtained from the seed. Dose—5 grains thrice daily.

(*b*) Syrup obtained from the pulp of the fruit. Dose—A dessert-spoonful to a tablespoonful thrice daily, in water.

(*c*) Wine obtained from the pulp of the fruit. Dose—An ounce thrice daily.

(*d*) Acetum obtained from the pulp of the fruit. Dose—One to two teaspoonfuls thrice daily.

The powder has been used by Deputy Surgeon-General Henry Blanc, of Bombay, with remarkable success in the treatment of diabetes. In my hands, it has not fared so well, though I have given 30-grain doses thrice daily. In many other hands, it has failed equally. The seed should be fresh, as it is liable to be destroyed by a kind of weevil which attacks it soon after, and sometimes even before, the fruit is ripe. The fruit is notably astringent to taste, though, when perfectly ripe and fresh, it is refrigerant. The preparations of the fruit are used in bilious diarrhœa, and are highly astringent.

N.O. Umbelliferæ.

(18) *Hydrocotyle Asiatica* (*Bramhi*). -The preparation exhibited is a succus obtained from the leaves. The dose for children is from ten to twenty drops in honey, thrice or four times daily. It is good as an intestinal tonic where there is catarrh of the mucous membrane, following habitual constipation. It is mentioned in the old Sanskrit work of Chakradalla. On the Malabar coast it is used in leprosy, but Dr. Hunter who tried it in the Leper Hospital of Madras so far back as 1855, says that the drug is not a specific. When I was surgeon in charge of the out-patients' department in the Jamsetyi Jijibhoy Hospital in 1886–87, I tried this drug in the anæsthetic variety of leprosy. At the instance of my friend Dr. Anno Moreshwan Kunte, B.A., M.D., who has charge of the Incurable (Leprosy) Asylum, attached to the Jamsetyi Jijibhoy Hospital, and has recently had great experience in the treatment of leprosy, I tried ten grains of the powdered leaves of this plant in about fifteen cases. It had a distinct effect on the sensory nerves. There were no doubt an improvement in the cases. The anæsthesia disappeared. I think that the cutaneous peripheral branches of the trophic nerves were stimulated, and the development of the tubercles

stopped. In the mixed form of leprosy where there are both tubercles and anæsthesia, if the latter can be stopped the tubercles will not form, as the further degeneration of the parts supplied by the nerves is effectually stopped. Here is a good field for further research. I must state however, that I never used the powder in advanced cases of leprosy, and used it only in the anæsthetic form. Dr. Kunte bears me out in my experience. It is recognised by the "British Indian Pharmacopœia."

N.O. Compositæ.

(19) *Spheranthus Indicus* (*Gorakh-mundi*). —The preparation exhibited is a water, containing in solution a very small quantity of the viscid oil, obtained from the plant. It was known to the ancient Hindus as an intestinal parasiticide, and is mentioned in Sanskrit works as *munditikâ*. It is used as a diuretic in Java, and is excreted by the kidney and skin; both the urine and perspiration of persons using it smell of the volatile oil. It is a powerful alterative and tonic.

(20) *Blumea* (several species), commonly known in Bombay as *Bhâmburdâ*.—The preparation exhibited is an insect powder made from the leaves of the various wild species of Blumea and Anona squamosa. The Blumeas have a reputation of destroying fleas. The powder of the Anona appears to be added to heighten the action of the Blumea leaves. They are both possessed of powerful smell, and contain large quantities of volatile oils in every part of the plant. In Bombay, floors attacked by fleas are brushed or swept with bundles of the blumea plant, dried or fresh.

(21) *Eclipta alba vel prostrata* (*Mâkâ* or *Bhrungi Râj*). —The preparation exhibited is a succus obtained from the leaves of the plant, which grows very commonly by the way side and green alleys in Bombay. It was used by ancient Hindus as a remedy against hepatic and splenic enlargements. Mr. Wood considers that the plant may some day supersede taraxacum. Dose—One or two drachms thrice daily.

N.O. Apocynaceæ.

(22) *Alstonia scholaris* (*Sâtvin*). —There are three preparations exhibited—there is an extract, a liquid extract, and a powder of the bark. From the powder of the bark an infusion is prepared (half an ounce to ten ounces of boiling water infused for an hour and strained). This plant has a parallel in the dry inland warm parts of East Australia, in the *alstonia constricta*, which Baron Sir Ferd. von Mueller says (*vide* "Select Extra Tropical Plants" p. 30), is "aromatic-bitter, and regarded as valuable in ague, also as a general tonic." The learned Baron recommends that the sap of all alstonias should be tried for caoutchouc. The tree was known to the ancient Hindus as *saptaparna*, *i.e.*, having seven leaves in a whorl, wherever they rise, unless abortive. It is still used by the natives of India as a powerful tonic and anti-periodic. It is known to the natives of Manilla as *dita*, from which an active principle "ditain" has been obtained. Ditain is considered quite equal to quinine in its anti-periodic properties, and has the advantage over quinine moreover, of not causing the unpleasant after-effects of "cinchonism." My friend, Dr. Bhalchandin K. Bhatwadekar, has used it in Bareda successfully, when court physician there some years ago, almost as a

specific I am told in reducing enlargements of spleen of malarial origin. The dose of the liquid extract is five to ten minims thrice daily, that of the extract is one to three grains thrice daily, and that of the powder of the bark five to ten grains thrice daily. The drug is worthy of an extended trial. There is an elaborate account of the chemical composition of this plant given in the "Year Book of Pharmacy" for 1881, and the plant has a recognised place in the "British Indian Pharmacopœia."

(23) *Holorrhena anti-dysenterica* (*Pâudhrâ, i.e., white Kudâ*).—The exhibit is the powdered bark. This plant is entirely distinct from the *Kâlâ* or black *Kudâ*, known as Wrightia tinctoria, the bark of which has often been substituted for the Holorrhena, and found inert. In selecting samples therefore of *Pâudhrâ Kudâ*, this fact must be remembered, as the Wrightia bark has not got the anti-periodic, tonic and anti-dysenteric properties of Holorrhena. The root bark of Holorrhena is bitter, that of Wrightia is only moderately so, if at all bitter. The bark of Wrightia tinctoria, besides, colours the saliva red. Holorrhena bark has none of this property. It is essential to know this diagnostic difference. In India, Holorrhena is largely used as a remedy in dysentery and diarrhœa. The dose of the powder is ten to twenty grains with opium. A decoction of the bark may be made by taking two ounces of the bark, adding it to two pints of water, and boiling it down to a pint. Dose—Half an ounce to two ounces, with a suitable quantity of tincture of opium, four times a day.

(24) *Plumeria acutifolia* (*Khairchampâ*). — The preparation is an extract from the bark of the tree, given in doses of from five grains to more. Extreme care should be taken in using this drug. It is found useful in intermittent fevers and gonorrhœa. I have reported a case * which occurred in my practice in the Military Detachment Hospital at Thana, where a private swallowed about two inches square of the thick bark to relieve constipation. He suffered violently from vomiting, giddiness, and dilated pupils ; clammy sweats on the face ; cold extremities ; intellect clear. He recovered. Eight days subsequently, he had exfoliation of the epidermal tissue of the whole body. The poisonous properties are in my opinion due to a glucoside having a purgative action. It must be remembered that the plant is leafless for nearly six months in the year; its glucosides, therefore, are abundant in the quiescent state, the sap undergoing concentration, and rendering the active principle obtainable in larger quantities from a given square inch of the bark, as compared with what may be obtained when the leaves are out.

N.O. Asclepiadaceæ.

(25) *Hemidesmus Indicus* (*Anant Mûl* or *Upalsar*).—The preparation exhibited is a liquid extract obtained from the fresh root. A drachm or two thrice daily, in two or four ounces of fresh milk and sugar or warm water, act as an excellent alterative, tonic, diuretic and diaphoretic. The plant is a well-known popular remedy in India in all kinds of constitutional debility, especially among children, who take it readily. On account of its diuretic properties, it is of especial use in rheumatic

* *Vide* Brigade-Surgeon Lyons' "Medical Jurisprudence," Bombay, 1888, p. 200 ; and *vide* "Bombay Medical and Physical Society's Transactions," vol. ix., new series, 1887, p. xiv.

affections, and in skin diseases arising from mal-nutrition and deficient action of the excretory organs. My friend, Dr. Guerson da Cunha, of Bombay, uses it largely, in a successful manner, as an alterative.

N.O. Bignoniaceæ.

(26) *Oroxylum Indicum*, Syn. *Calosanthes Indica* (*Tetu*). — The preparations exhibited are (*a*) powder of the bark ; (*b*) an oil obtained by boiling the bark in teel or sesame oil ; and (*c*) a syrup of the bark. The bark is used usually in the shape of a powder in from five to fifteen grain doses thrice daily, or in the shape of an infusion (one ounce of the powder to ten ounces of boiling water) an ounce thrice daily. Its chief use is as an astringent in dysentery and diarrhœa. It is not nauseating, and has thus an advantage over ipecacuanha. It is also a sudorific. It is a very ancient remedy, and is described in the Sanskrit work of Shârangdhan. The oil is used in otorrhœa. The syrup is a very agreeable preparation ; it also preserves the active principle of the bark better. Applied externally in the shape of a paste of the bark powder, it is an anodyne in the swellings of rheumatism.

N.O. Acanthaceæ.

(27) *Adhatoda vasica* (*Adulsâ*).—The preparations exhibited are the succus and the mel from the flowering tops and leaves. The honey of adulsâ is mixed with ginger and long pepper. This is a very ancient household remedy for asthma and bronchitis of a catarrhal and chronic type. There are also among the exhibits some cigarettes made from the leaves of this plant, which are effectively used in Bengal for asthma. The dose of the honey is a teaspoonful or more three or four times daily. Of the succus, a dessertspoonful in water. In selecting the plant, it must be remembered that there are two varieties—the white and the black adulsâ, the "white" being variegated, and the "black" dark-leaved.

(28) *Rhinacanthus communis* (*Gajkarna*).—There are two preparations from the root, viz., the powder and solution (tincture ?), as Mr. Pareira calls it, of the root. There is also an extract from the leaves, which is mixed up with fresh lime-juice, and applied over parts attacked with ringworm. I do not know whether the solution or the extract is the better preparation of the two. Dr. Dymock says, "The extract is the best." The powder also has to be mixed with lime-juice, before it is used as an application for ringworm. The analysis of Liborius show that the plant contains a dull cherry-red substance, called rhinacanthin, which seems to be related to chrysophanic and frangulic acids (Dymock). Hence the value of the plant as a destroyer of vegetable parasites of the human skin.

N.O. Amarantaceæ.

(29) *Amarantus spinosus* (*Kânte Mât* or *Tandulya*).—Syrup of the root exhibited. It is useful in gonorrhœa, for stopping the muco-purulent discharge and scalding, probably acting as an emollient. Dose—A teaspoonful or more in water, three or four times daily.

N.O. EUPHORBIACEÆ.

(30) *Croton oblongifolium* (*Gansûr*).—(Figured for the first time in Kirtikar's "Illustrations of the Bombay Flora"). The powder of the root is exhibited. Dose—Three grains, or more, short of purging. "In the Southern Konkan," says Dr. Dymock, "it has a reputation as a remedy against snake-bite. The inhabitants of Goa, says he, use the bark for chronic enlargements of liver, externally (as a paste), and internally, and also in remittent fever. The value of the plant is due probably to the resinous substance the bark contains.

(31) *Euphorbia pilulifera* (*Dkâkti Dudhi*).—There is a syrup and a powder obtained from the whole plant. Half an ounce of the powder, with two quarts of water, boiled down to a quart, makes a very good decoction, of which a wineglassful may be given thrice daily, after meals, in chronic bronchitis and asthma. It has been tried with benefit at the J. J. Hospital, of Bombay. Of the syrups, a drachm given thrice daily, in water.

(32) *Acalypha Indica* (*Khokli*).—There is the succus and the ethereal tincture. The latter is a preparation used by Brigade-Surgeon Langley, of Bombay, whose extensive practice affords him many opportunities of testing the value of his prescription. "The natives," says he, "use it in congestive headaches. A piece of cotton is saturated with the expressed juice, and inserted into each nostril ; this produces hæmorrhage from the nose, and relieves the head symptoms." Twenty to sixty minims of the ethereal tincture frequently given to a child during the day, in honey, act as an expectorant and nauseant ; very particularly useful, therefore, in bronchitis in children as a substitute for ipecacuanha, which acts as a depressant. In large doses, it is an emetic of equal value. It has no tendency to act on the bowels like other euphorbias. Dr. Ross ranks it with senega.

With these few observations, I proceed to describe three new plants of medicinal value, which are not included by Mr. Pareira in his pamphlet, a few copies of which I place in your hands for perusal. The plants, yet unrecognised medicinally, and of which I have preparations here, are :—

(1) *Casearia esculenta* (*Modi*, or *Bitori*).

(2) *Siegesbeckia Orientalis* (*Piwalâ*, *Bhângrâ* or *Sonki*).

(3) *Flemingia tuberosa* (*Bhârtondi*).

Casearia esculenta is a plant of the natural order Samydaceæ (Hooker), and is known by the natives of India as Modi. In Salsette, it is known as Bitori. It has a thick root, often reaching the size of two inches in diameter, and having seven concentric rings. It is therefore called Sâtjâna, with seven rings, or layers. It has also seven distinct properties as a medicine internally administered for hepatic congestion, for hæmorrhoids, and for the relief of the portal congestion generally. It also acts in reducing splenic enlargement and jaundice produced by splenic enlargements. It is useful for jaundice, as the result of duodenal catarrh. It is also an excellent stomachic tonic. I have used it lately with marked benefit, in the shape of an extract prepared from the root, and it no doubt relieves the portal congestion, which promotes the hæmorrhoids.

Siegesbeckia Orientalis belongs to the N.O. *Compositæ*. In the tribes formed in the re-classification of this N.O. in Bentham's "Genera Plantarum," this plant is consigned to the tribe *Helianthoideæ* (heads heterogamous, rayed, or rarely discoid, or with the ray suppressed, and then homogeneous). This plant is named by Linnæus in derision of the high pretensions of one of his contemporaries—Siegesbeck—who contemned his sexual system! I am sure, in thus expressing his contempt for a literary enemy, Linnæus has unconsciously immortalised a name that he would rather have had forgotten. The plant is known to the natives of Bombay as *Pivalà Bhàngrà*, or *Sonki*. It is widely distributed in India. It is a hardy annual about two feet in height; flowers in September, with yellow heads; leaves ovate, cuneate at base, acuminate, and closely toothed; the upper ones oblong, lanceolate; the exterior scales of the involucrum, twice the length of the involucrum. —D.C. l. c. 5, 495. The properties of the plant are those of a powerful alterative, and it is made use of by the natives in syphilis. Whether it has any effect on the syphilitic virus or not, I am not prepared to say. I recommend the plant a trial, which is well worth having. It is largely used by the natives of Mauritius, and I see from the *British Medical Journal* of June 25, 1887, that a syrup of its leaves is used by Mr. Hutchison, of Glasgow, as an alterative in syphilis, scurvy, and scrofula, and that its leaves are used for poultices to gangrenous and sloughing sores. The chief property for which Mr. Hutchison uses it, is that of a cutaneous stimulant and parasiticide in ringworm. A tincture with an equal part of glycerine is used morning and evening for killing trichophyton tonsurans in tinea circinata and tinea tonsurans, and microsporon furfur of tinea versicolor. It is also useful in killing the parasite of tinea sycosis (Mentagrophyton). It is well worthy of an extended trial in India in its new form of the syrup I place before you.

Flemingia tuberosa.—This plant is described by Dalzell, and I reproduce a brief description, Mr. President, from your own work—"The Select Extra Tropical Plants"—a copy of which you were so gracious as to present me with at our very first meeting in this city:—

It is found in Western India. It belongs to the natural order *Leguminosæ*, and is known to the natives of Bombay as *Bhârtondi*. The tubers of this herb are said to be edible; they are generally of the thickness and length of our thumb, pointing like a spindle at each end. Baron Sir Von Mueller says that there is on record another species—*F. vestita* (Bentham)—cultivated for its small esculent tubers in North-Western India, where it ascends in the temperate region up to 7000 feet. Its chief use is, that it acts as a demulcent in diarrhœa and dysentery. I have here tablets prepared of it, from the powdered tubers, by Mr. Pareira, which are deserving of a trial. Whether they have any astringent property, or whether the roots act merely as a demulcent and soothing agent in affections of the bowel, I don't know from personal experience, as the preparation was put into my hands just as I was starting for this colony.

All these preparations are quite recent, and I hope you will pardon me if I bring them before you without being able to say anything about them of a substantial character, in the shape of physiological and clinical observation, from personal experience that would lead to their ready introduction into medical practice. I am simply desirous of showing

how much European pharmacy is capable of doing for the vast and yet unexplored store of the indigenous products of India.

There are other plants, such as the *Carica Papaya*, and the *Gymnema sylvestre*, which are now attracting deserved attention even in England, —the one as containing *papain*, and the other as containing an active principle lulling the sense of taste for sugar. The latter is looked upon as a remedy for diabetes. There is also a loranthus growing on strychnos nux vomica, which has been brought to my notice by a young man who has diabetes himself, and who has himself found relief, and given it generously to others. I have tried his pills, made from powdered leaves (eight for four days, used with ℥ss ghee daily), but I found that no good was done.

NOTES ON AN EXHIBIT OF INDIAN REMEDIES.

By R. Temple Wright, M.D., M.R.C.P. Lond., F.R.C.S. Eng.

Surgeon-Major H.M. Bengal Army. Civil Surgeon of Jaunpur.

Pulv. Belæ Co. (compound bael powder).—℞. Bael fruit pulp, 2 oz. (avoirdupois); âm choor, 4 oz.; ispaghûl seeds, 1 oz.; acacia gum, 1 oz.; ginger, ½ oz. All these should be dried and powdered separately, then carefully mixed and pounded; then two parts of this mixture should be mixed with one part of powdered sugar. Dose—One drachm every three or four hours. It is very useful in diarrhœa and dysentery, especially in children, and is by no means disagreeable, while it causes none of the nausea of ipecacuan. Cost—Made locally in the dispensaries at the headquarters of districts, it costs about a rupee a pound (say two shillings per lb.), in ordinary years, when the crop of mangoes is not deficient.

The botany of the above preparation is as follows :—

Bael (Ægle Marmelos), a large tree, natural order Rutaceæ. The medicinal part is the fruit, like a large apple, with a hard, thick, rough, green, woody rind. This is cut open with a hatchet when ripe, or three-parts ripe, and a coarse, yellow, stringy pulp is scooped out. This is dried and powdered, and preserved in corked bottles for use.

It is also made into a syrup with sugar and water at once, when fresh, and then it tastes something like an apricot. It is called by the natives bael sherbet, and is quite as efficacious in this form as in the state of dried powdered pulp.

The liquid extract of bael is also efficacious when fresh, but it does not keep well, so this form has caused disappointment when exported.

Amchoor, made from mango fruit. Mango Mangifera Indica, natural order Anacardiaceæ, a fine shady forest tree. The medicinal part is the unripe fruit, split open and dried in the sun, without the seed. The seed is a very large kernel, forming about a third of the bulk of the fruit, which may weigh from three to eight ounces. The kernel is pounded, and used by the natives as a remedy against lumbrici, hæmorrhoids and menorrhagia.

The native word for "mango" is "âm." The dried unripe fruit is called "katai," *i.e.*, something acid, as they pound a little every day to eat as a relish with their food. When the katai is pounded, it is called *âm-choor*, or *âm-sool*, and is a valuable anti-scorbutic if given in food to the extent of an ounce per day. It is also used for cleaning lithographic slabs, removing ink and grease.

Ispaghul (seeds of plantago ispaghula), natural order Plantagineæ. When moistened, these seeds, whole or powdered, swell up, and are very demulcent, often stopping diarrhœa, which has resisted all other treatment.

Cinchona Febrifuge. When quinine could be obtained only from Peru, the price was so high as to be prohibitory, so the Government of India obtained seeds and cuttings of various species of cinchona, and planted them in India, on the Himalaya mountains in the north, and the Neilgherries in the south, where they have been acclimatised so successfully that, after supplying its own State hospitals, Government sells to the public cinchona febrifuge at twenty rupees per pound. On its tins the following label is pasted, giving an analysis of the mixed alkaloids in it :—

Analysis.

Quinine	12·16	per cent.
Quinidine	00·56	,,
Cinchonine	25·00	,,
Cinchonidine	34·98	,,
Amorphous alkaloid	8·20	,,
Ash	6·62	,,
Water and colouring matter ...	12·48	,,
Total	100·00	,,

It forms a brownish-yellow powder, having a disagreeable odour, and such a nauseating taste, that it cannot be given in large doses, like quinine, without causing vomiting.

To prevent this, it is made into pills of two grains each with gum water, two of which are given every three hours, while fever is absent. Its effect as an antiperiodic is thus secured without bad result, and the drug is distributed to the million by native doctors, vaccinators, and policemen.

The importance of it may be judged from the fact that fever causes about three-fourths of all the deaths among the natives of India—all other causes being insignificant, even including epidemics of small-pox and cholera.

The death-rate from cholera is only 1·8 per 1000 in the very worst parts of lower Bengal—a damp climate—while it is only 0·2 per 1000 in Sindh—a dry climate.

Ext. Jambolanæ Liquidum (Kemp).—Fluid extract of the seeds of *jambul*, natural order Myrtaceæ, Eugenia Jambolana (Blanc), or Syzigium Jambolanum (Waring).

It was first introduced into general use by Dr. J. H. Blanc, Bombay Army, in 1844, as a most useful drug for diabetes. Dose—One or two fluid drachms in water three times a day.

While taking jambul the diet is not restricted in any way, as jambul has a remarkable power of preventing starch from being converted into sugar, the urine in two or three weeks having its specific gravity reduced from 1042 to 1020.

It is carefully prepared from the fresh fruit every year, in Bombay, by Messrs. Kemp and Co., who doubtless could also supply the other things mentioned in this paper.

Joara Hari, or Fever Killer, a patent preparation of Mr. Bowden, Madras. It is like Warburg's Tincture, a combination of quinine with certain aromatic substances, which are powerful diaphoretics; but it has a far nicer taste than Warburg's Drops. It often checks intermittent fever, when all other things have failed. Like all other febrifuges in India, it should be preceded by a purgative—pil. podophyl. being generally preferred.

ON A NEW MODE OF ADMINISTERING THE PROTOXIDE OF IRON.

By Thomas Shearman Ralph, M.R.C.S. Eng.

Associate of the Linnean Society, London.

It is both interesting and instructive to look back on the various ferruginous preparations which from time to time have been placed at the disposal of the medical practitioner, to aid him in what no doubt was the thing needed, viz., a further accession of iron in the circulatory system, and when this effort proved successful, most probably the result was favourable both to the patient and to the administrator.

One of my oldest Ferric acquaintances was the "Ferrum tartarisatum," and with this there was an ancient form—and a good one—but which has well nigh been cast into oblivion, with much likelihood of becoming a rusty compound. For, as most of us know, or are likely to know, the old Griffith's mixture, which has for its base a subcarbonate of iron (or rather a carbonate of the protoxide), while it was good and active during its green coloured state, soon assumed a rusty brown, and became inert. And the mixture also was not agreeable to the taste, owing to the companionship of pulv. myrrhæ.

These forms, with the old rust-coloured oxide of iron, which years ago was administered in very bulky doses, and seemed to be serviceable in its employment, have all waned before fresh combinations of the base, *i.e.*, ferrum united with some acid or saline. And each has had its day, and number of patients, fair trial, and share of approval, and have bestowed, no doubt, a modicum of benefit.

Our lists of combinations of ferrum may be classed roughly under three groups :—

The metallic forms and the oxides, including the carbonated oxides ; the saline forms, or those combined with mineral acids; and those compounded with vegetable acids.

The first group appears to me to be an unsatisfactory form, the metallic base requiring some internal menstruum to introduce the iron gratefully into the system, and the oxides ready at any time to become inert by the absorption of oxygen *in transitu*.

The saline form tending to a styptic or astringent action, and as such, perhaps, passing slowly and uncertainly into the blood system; or, possibly, the iron becomes engaged with decomposed products in the stomach, and passes into the form of carbonate or peroxide.

The third group of vegetable acids and iron appears to me to approach that condition of iron which closely resembles the above changed or decomposed form, the result of change in the stomach.

In none of these forms is the iron in a state of true protoxide, and if this condition is the necessary one, and the best for absorption, then all iron, which is not in proto-form, is likely to be so much waste; hence, perhaps, came the necessity for the exhibition of large doses, as was especially the case in the use of the peroxide of iron, of which half ounces were formerly given, and out of which the absorbents drew, or obtained, a modicum of protoxide, or a form of iron readily absorbed, the rest being useless lumber.

Phosphate of iron seems to suggest a means of supplying two important elements for the blood and hard tissues, hence phosphorus has appeared combined not only with iron, but also with lime—another much wanted ingredient; as if in presenting these two combined, iron and phosphorus, we said to the system of our patient—*Utrum horum mavis accipe*.

Years ago this consideration occurred to me, that if we could increase the amount of iron and phosphorus in our cereal food, we should perhaps be more successful in stealing our way into the systems of our patients; but all this is speculation, perhaps a necessary one for the next and rising generation to brood over, and supply a new formula, and boast itself of the pharmaceutical and therapeutic wisdom thereof.

The formula which I bring before your notice, I think, is likely to supply to a great extent a needful active form of iron, and will prove a pleasant, or at any rate, a non-disagreeable administration of an important element to the animal economy.

I wish briefly to inform you that the formula which I advocate is one in which the protoxide of iron (the essentially active and advantageous form in which iron can be presented to the system), is in chemical combination with albumin, and that under this condition the stomach does not appear to be offended at its introduction; and that it does not act as a styptic, seldom causes constipation, and moreover is not in a hurry to assume that peculiar complexion which indicates a change of value in its usefulness, *i.e.*, rustiness or peroxidation.

The method of preparation requires to be strictly carried out, and when it shall fall into the hands of a modern pharmacist, I have little doubt it will be more suitably prepared than I have been able to effect; but the basis—the protoxide state—must be maintained.

I have made trial of it in children; also in those adults who have seemed to require the administration of iron, and have found marked and rapid beneficial results. I should like it to be tried in some cases of pertussis, but more especially in typhoid fever, when exhaustion comes on, from what to me seems little recognised in the progress of

this fever, *i.e.*, the loss of a large amount of iron in the form of hæmoglobin, as well as in the direct loss of blood from the ulceration of the bowel structure. An effort in the direction of supplying this serious loss is made by the employment of liq. carnis, which to my mind is by no means a pleasant remedy, nor one which I feel inclined to recommend, as I look upon it as stale food when compared with freshly prepared meat broth.

Albuminate of the Protoxide of Iron.

Take thirty grains of protosulphate of iron, and dissolve it in about six ounces of boiled water, and filter. To this add liq. ammoniæ in excess; gently stir, and allow the precipitate to settle; then syphon off the supernatant fluid, and add more water; allow to settle again, and when the precipitate has fallen as densely as possible, syphon off again, and add about a teaspoonful of fresh white of egg; add more water, and allow to settle thoroughly; syphon off carefully, and place the precipitate in a shallow vessel and allow the excess of water to evaporate in a water bath, at a temperature below the coagulating heat of albumen; when the precipitate has become well thickened, add confectioners' sugar to thicken it still further, so that it can be made into tablets.

Sixty from the above mass will make a convenient size, and each will represent half a grain of the sulphate, and constitute an ordinary dose for a child.

SECTION FOR DISEASES OF THE SKIN.

PRESIDENT'S ADDRESS.

By JAMES P. RYAN.

Chevalier of the Legion of Honour, &c.

GENTLEMEN,—When thinking of a subject for the short address which it is my pleasure as well as my duty to deliver before you this afternoon, it struck me that a brief enumeration of the various kinds of skin affections which have come under my observation, and a short account of some of them, might not be without interest.

The experience to which I shall appeal has been gained during a period of fourteen years at the Melbourne Hospital, the last year and a half of which has been at the skin department, some fifteen years' attendance on the Abbotsford reformatory schools, and from private practice.

Unfortunately no statistics are available, so that when speaking of numbers in relation to cases, I am but expressing an opinion. For this reason, I am unable to say if diseases of the skin are more prevalent here than in Great Britain. But the varieties which come under one's notice are much the same in Melbourne, Paris, New York, or London, though the relative proportions in which they occur are probably different in each place. For instance, scabies, which is common enough in London or Glasgow, is less frequently encountered in New York and Melbourne. Indeed, in Melbourne it is an uncommon disease. Nor is the reason far to seek. It is for the most part found associated with poverty, dirt, and over-crowding—conditions which as yet are rare in Australian towns. Then on account of our warmer climate, and the plentiful supply of water which even the poorest in Melbourne have at hand, general washing and bathing is more a custom amongst the humbler classes here, than it is amongst the same classes in England.

The appearances classed as scrofuloderma—including lupus in all its forms—is certainly less frequently met with here than in the older countries, very largely through the better feeding of our population.

Dr. Bulkley, in his manual of "Diseases of the Skin," gives an analysis of 8000 cases collected from private and hospital practice in New York, showing the relative frequency of these diseases in that city; and his tables, I think, express pretty accurately the relative

frequency of such diseases in Melbourne. Eczema there, as here, is the commonest of all, and accounts for one-third of the 8000 cases. Then come—

Acne in the	Proportion	of 12	per cent.
Syphilis ,,	,,	10	,,
Phthiriasis	,,	5	,,
Ringworm	,,	4½	,,
Psoriasis	,,	4	,,
Urticaria	,,	2½	,,
Lichen	,,	1½	,,
Zoster	,,	1	,,

And the others in varying proportions under 1 per cent.

At the Melbourne Hospital, the syphiloids occupy the pride of place, no doubt through the fact that the great majority of patients suffering from syphilis are drafted into the skin department.

Sycosis (which only occurs twenty-seven times in Bulkley's 8000 cases) is common enough here, the non-parasitic form being the one usually met with. The tinea tricophytina barbæ is, I think, a rare disease with us. There is a milder form of inflammation, eczematous in character, which attacks the region of the beard and whiskers. Its more superficial character, the fact of its often extending to non-hairy parts, or its appearing simultaneously upon them, and its being easily amenable to treatment, distinguish it from true sycosis.

I have met with two cases of chloasma uterinum, and the occurrence of the disease in both was coincident with pregnancy. In one it was present for the first time, in the other it had recurred during four pregnancies, disappearing after child-birth, to make its reappearance in the second or third month of carrying. In this connection, I may mention a pigmentary syphiloderm in a young man who had had a chancre five months previously, followed by other evidences of secondary syphilis. The pigmentation was deeply marked, and spread out in map form on the back of his neck, between and on the shoulders, and down the arms to near the elbows. It bore a strong resemblance to tinea versicolor. To clear up the diagnosis, no local application was used, and it disappeared under internal treatment by mercury.

Prurigo occurs only once in Bulkley's tables. I am aware that other affections, such as phthiriasis, papular eczema, lichen urticatus, pruritus, &c., are often classed as prurigo; but I am convinced that it exists in a form sufficiently characteristic to entitle it to a separate and distinct name. Take the following case as an example, and I have come across many others of a similar kind :—

A middle aged man, not over robust and of sedentary habits, is suddenly attacked, most frequently during the night, by intense itching

of the inside of one or both knees, the affected area sometimes extending half way up the thigh. At the commencement, a number of small pale-coloured papules may be seen, as well as felt, which are evidently slightly enlarged papillæ. The skin soon becomes infiltrated from the irritation produced by scratching, the papules are torn, blood is effused, and in a few days the affected part shows the type of ordinary senile prurigo. There is then thickening, increased pigmentation, a slight furfuraceous scaling, and, at the end of a week or ten days, the skin has usually returned to its ordinary healthy condition. Many such attacks may occur during the year, and the patient is convinced they are most frequently brought on by indiscretions in eating and drinking

A disease which prevails here amongst children more frequently than is suspected, and which on account of its contagious properties should be recognised and treated as early as possiple, is impetigo contagiosa. The lesions begin as small separate red papules, which rapidly develop into vesico-pustules, and dry into yellow or brownish crusts, and in some cases of unhealthy subjects, they become ecthymatous in character. The disease affects by preference the hands and arms, the feet and legs, the back and neck, and it often extends to the face and trunk. Here is the history of an out-break in a family, in which the father, mother, and six children were attacked :—One of the boys, aged 12, was away from home for some time, and came back with an eruption. He usually slept in the same bed with a younger brother, who soon took it. Then an elder sister was attacked, who probably gave it to a baby in arms, and it spread to the mother, father, and the other children. The only member of the household who escaped, was a girl of 16, who acted as maid of all work. Here the extremities were affected in every case, the face in two, and in one a few spots were found on the trunk. The question arises, might it have been scabies? I think not. The eruption was more frequently found on the extensor aspects of the limbs, it attacked the face, it showed no special predilection for the wrists and interdigital spaces; itching, though sometimes present, was not a marked symptom, and though I made frequent searches, I failed to find any trace of the cuniculus, or of the acarus itself. Then in every case there was some febrile disturbance. The diseases with which it is most likely to be confounded, are varicella, pustular eczema, and scabies, but I do not think there should be much difficulty about the diagnosis.

Amongst the rarer forms of skin diseases which have come under my notice, I may mention dysidrosis, pemphigus solitarius, pityriasis rubra, ichthyosis, and leprosy. The case of pityriasis rubra was a typical example of the disease. The patient, a German about 30 years of age, had had it for three years when I first saw him. He informed me it began as a red, somewhat itchy patch on the chest and abdomen, and

quickly, that is within a few weeks, extended over the whole body, and that it has remained about the same ever since. There was reddening, but without any thickening of the entire skin, with the almost constant formation and shedding of fine branny scales. Sometimes large portions of the skin were quite smooth and glossy, and then the redness was most intense. There was little or no itching, his urine was free from albumen, and his general health appeared to be fairly good. He often complained of feeling chilly, though he said he always felt better in the cold weather. Hot bran baths appeared to allay temporarily the irritability of the skin, but although he had been under all sorts of treatment by different medical men, from none did he derive any permanent benefit.

I have seen only one well-marked case of dysidrosis, the cheiro-pompholix of Jonathan Hutchinson, for I believe the two are identical. It occurred in a young and rather delicate woman, a seamstress by occupation, and had existed for about two months when I first saw her. The sago-grain appearance of the deep-seated vesicles was sometimes exceedingly well-marked. She got well in three or four weeks under mineral tonics and bitters internally, the local treatment consisting in keeping the hand constantly covered, and applying lead and belladonna lotion.

Zoster has come under my notice much more frequently in adults than in children. The two following cases are of some interest :—A man of 55 years had intercostal neuralgia for a week, when a crop of papules appeared in the site of the pain. They were situated on an inflamed base, fresh ones appeared from time to time, but at the end of a fortnight they had died out, leaving behind some discoloration, and the neuralgia persisted for ten days longer. There was no vesiculation, for I saw him frequently, and watched him carefully during the course of the disease. In this case the skin lesion was very mild, or aborted as Hebra terms it ; but the neuralgia was exceedingly severe and persistent, and required for its amelioration the almost daily use of subcutaneous injections of morphia. The other case was that of a delicate girl of 11 years, who complained of pain in the right side of her head. In a couple of days a few vesicles appeared above the eyebrow and on the temple, and the pain ceased. No fresh ones were formed, and the disease rapidly died out, but she complained of something being wrong with her right eye, and on examination I discovered a central corneal ulcer, evidently the result of a broken down vesicle. The ulcer was tedious in its healing, and left a facet or flattened spot (not a nebula), which spoiled the curve of the cornea, and resulted in permanent astigmatism. I have seen here only one case each of ichthyosis and leprosy, both of which will by and by be more particularly brought under your notice. Malignant pustule must surely occur in up-country districts if not near

town, and yet I have not met with it here, though I have seen it in other countries.

So far then as my experience goes, the skin diseases which come under the notice of the physician in Melbourne are identical in character with those which present themselves to the medical man in Europe and America; and as yet, neither climate nor surroundings here have developed any novel feature in the etiology and morphology of these affections.

NOTES ON THE TREATMENT OF SOME OF THE MORE FREQUENTLY MET WITH SKIN DISEASES.

By R. L. Faithfull, M.D. New York, L.R.C.P. et L.S.A. Lond.

Eczema.

This form of skin disease is probably brought under the notice of the physician or surgeon more frequently than any other, and not infrequently gives him the greatest amount of difficulty to treat; for although the prognosis is favourable generally as regards its curability, yet the length of time and patience to bring this about differs widely according to the form of eczema under treatment, as well as to the age, habits, and general condition of the patient. The treatment being local, or both local and internal, due attention should be paid to the pathological condition, as well as to any co-existing constitutional disorder or organic affection present. This being taken for granted, I take pleasure in bringing to the notice of my professional brethren some drugs and local applications with which good results have been brought about when other remedies appeared to have failed, and which now I am in the habit of prescribing, if not otherwise contra-indicated.

In cases of eczema attended with acute violent inflammation, intense itching, swelling, and pain, I prescribe "jaborandi" or "pilocarpine," alone or in combination with acetate or citrate of potash, digitalis, aconite, veratrum viride, pulsatilla, or rhus toxicodendron; and apply locally some soothing powder, such as starch or chalk, &c., which, if it is desirable, may be medicated with any drug or fluid extract that is soluble in alcohol, ether, or chloroform, in the following way:—Dissolve the drug or fluid extract in any one of the above solvents, then carefully and thoroughly mix in a mortar with pestle a given quantity of this medicated solution, according to the requirements of the case, with a given quantity of the starch or chalk, or any other insoluble powder. This being done, place the medicated powder on a flat open dish to dry (heat, as a rule, should not be employed in the drying process): when thoroughly dry, it can easily be reduced to an impalpable powder, and is then fit for application.

The advantages of thus medicating powders for topical application are—(1) A much wider range of drugs can be used, and the quantity of

the medicament can be most accurately determined; (2) the powder absorbs the moisture present, and brings the medicament in direct contact with the diseased surface; (3) it is generally well borne, can be easily applied, is cool, cleanly, and effective. The disadvantage is the cost of preparing (properly) small quantities of such powders, as it is always advisable to have them freshly made.

In some cases, oils or ointments are more grateful, and these can be medicated in various ways according to the indications present. When these are badly borne, soothing lotions of boracic acid, carbolic acid, or the fluid extracts of calendula, phytolacca, or grindelia robusta, diluted, may be advantageously used.

In the more chronic cases, I combine the pilocarpine with some of the mineral acids or acid glycerine of pepsine, liq. pot. arseniatis, liq. sodæ arseniatis, oxalate of cerium, or nux vomica.

Eczema of the scrotum and genital organs has yielded well under the internal use of tinct. hoang. nan. conctd. alone or combined with acetate or citrate of potash, together with one of the following local applications:—℞ Hydrargyri oxidi flavi grs. x-xx, hydrargyri ammoniati grs. x–xv, zinci oleatis ʒj–ʒjss., vaseline ad. ℥j, mix with or without the addition of camphor grs. x–xv; or should the above prove too stimulating, apply the following:—℞ Bismuthi oleatis ʒij–ʒiv, ungt. zinci oxidi ad. ℥j, mix.

Eczema of the palms of the hands is one of the most obstinate forms of this disease. In chronic cases, the following has proved most satisfactory in removing the hard cuticle:—℞ Thymol. grs. x–xx, acidi salicylic ʒj–ʒjss., saponis mollis ad. ℥ij, mix. Rub a little of this well in over the part once or twice a day, or every second or third day, according to the effect produced, let it remain on from half to one hour, then wash off with water as hot as can be borne, into which a teaspoonful of pulverised borax to the pint has been dissolved, and after drying rapidly by mopping with a soft towel, apply one of the following ointments:—℞ Bismuthi oleatis ʒij, chloral cum camphorâ ʒj, acidi salicylic grs. x, ungt. zinci oxidi ad. ℥j, mix.; or, ℞ Resorcin grs. xxx, glycerini ʒj–ʒij, vaseline ad. ℥ij, mix; or, ℞ Hydrargyri ammoniati grs. xx, hydrargyri oxidi flavi grs. xv, zinci oleatis ʒj, vaseline ad. ℥j, mix.

Tertiary Syphilitic Ulcers.

The diagnosis of these is not at all times an easy matter, for obvious reasons, but a careful examination into the history of the patient, the situation of the ulcer or ulcers, and a thorough inspection of the rest of the body, will generally throw sufficient light upon the case. Still, in doubtful cases, which not unfrequently occur, specific treatment may be the only means of clearing up the case.

These ulcers are prone to occur in subjects of oldstanding syphilitic taint, and are generally due to one of the late lesions of syphilis, viz., an ulcerating gummatous, tubercular or ecthymatous patch, but no matter what may be the starting point, an ulcer is produced with the following suggestive features:—The ulcers are circular, oval, or horse-shoe shaped, excavated, with edges more or less hardened, regular, sharply cut, perpendicular (sometimes slightly overhanging), and of a dull red or livid colour, with a pultaceous floor, and a tendency to scab over if exposed to the air. They are usually painless, unless through injury or

by their position they become inflamed, or the periosteum becomes involved in the ulcerative process, and if not treated, tend to pursue a protracted course.

In the treatment of these ulcers, the following prescriptions have given me much satisfaction:—R. Potassii iodidi vel sodii iodidi ʒj–ʒiij, liq. ferri iodidi conctd. ʒj–ʒijss, glycerini ℥ij, aquæ chloroformi ad. ℥viij, mix. One tablespoonful in water half an hour after meals. R. Ext. erythroxylon cocæ fl. ℥j–℥ij, ext. stillingiæ fl. ʒv–℥ij, Syr. menthæ piperitæ ℥ij, aquæ ad. ℥viij, mix. Tablespoonful in water an hour after meals.

It was from Dr. Robert W. Taylor, of New York, that I first learnt the value of ext. cocæ fl. in syphilis, as an adjuvant to specific treatment. Lately, I have used the ext. kola nut. fl. (sterculia acuminata) in doses of m. x–xxx or more, with equally as good results as the ext. cocæ fl. It is far pleasanter to take, and is not so apt to disagree. Many patients, after having taken the "coca" for a short space of time, complain bitterly of its nauseating and disagreeable taste, and beg to have the drug discontinued. I now prefer using the ext. cocæ in pills of grs. iij each.

In some cases, I find the additional use of mercury of the utmost value, and my favourite preparation has been the tannate.

Local treatment consists in bathing the ulcer or ulcers night and morning for ten to twenty minutes, with water as hot as can be borne, then applying one of the following powders:— R. Hydrastin ʒj, baptisin ʒj, iodoformi ℥iij, mix, ft. pulv. Dust lightly all over the ulcers, after bathing and mopping dry. R. Ungt. zinci oxidi; apply thickly upon a piece of lint large enough to cover the ulcerated surfaces, cover over with a piece of indiarubber tissue, and bandage snugly. R. Alnuin ʒj, hydrastin ʒj, baptisin ʒj, zinci oxidi ℥vj, mix, ft. pulv. Dust lightly over the ulcers after bathing, if the iodoform is objectionable. For some time past I have used salol, alone or in combination with iodol, zinci oleas, bismuthi oleas or subnitras, with results, if anything, better than those produced by iodoform. The above applications are certainly far pleasanter in every respect for the patient.

Note.—The fluid extracts used are those prepared by Dr. E. R. Squibb, of Brooklyn, New York; and Parke, Davis and Co., Detroit.

NOTES OF A FATAL CASE OF PEMPHIGUS.

By Alfred Austin Lendon, M.D. Lond.

Lecturer on Forensic Medicine in the University of Adelaide; Honorary Medical Officer, Adelaide Children's Hospital; Honorary Assistant Physican, Adelaide Hospital.

During the five years that I have practised in Adelaide, with opportunities for observation at both our hospitals, I have only met with this one case of pemphigus:—

Edith B., æt. 5, living at Kingston on the south-east coast of this province, was admitted under my care at the Adelaide Children's

Hospital on July 5, 1886; and, with the exception of a week in the ensuing November, remained there till September 23, 1887. Her history was as follows:—Family history good; no member of it had suffered from any special skin eruption. About Christmas 1885, an epidemic of so-called "native pox" occurred amongst the children at Kingston; all recovered except Edith B., who never got rid of it, and seven months later she was sent up to Adelaide for treatment.

On admission, her general health seemed to be very good, and she was not feverish. There was no evidence of a syphilitic or of a strumous taint, or of any lesion of the nervous system. She presented, however, the characteristic eruption of pemphigus vulgaris, distributed mainly into two great groups of blebs. The upper group occupied the face (including the eyebrows and ear), neck, chest, both front and back, and axillæ, and comprised numerous tense bullæ of the size of a pea, and equally numerous scabs and stains of former bullæ. The lower group occupied the front of the abdomen, the pudenda, and upper part of the thighs, and embraced every variety of size and stage of the lesion. Here were seen the early commencements of the disease as small reddish papules; the reddish papule a little more advanced, with a bleb on its summit about the size of a pin's head; the fully developed blebs of different sizes (some half an inch in diameter), of ovoid shape, with smooth distended and translucent cuticle, and clear yellowish serous contents; other blebs somewhat flaccid and pendulous, with perhaps some turbidity of the lower half of their fluid contents; blebs still more flaccid from escape of fluid, with the cuticle wrinkled and in some cases umbilicated, or else no longer raised above the surface, and showing a ring of inflammatory redness at their margins; excoriations of a quite superficial nature, and scabs from drying of the effused serum; stains of a rosy red or a deep purple tint, but always darker at the circumference than towards the centre. There were single scattered blebs seen here and there over the back and on the extremities, as though the tendency were for the eruption to spread downwards, and later on this proved to be the case. None were noticed on admission on either the palms of the hands or soles of the feet. A very considerable amount of irritation accompanied the eruption, causing the child to rub herself and aggravate her condition; and at night-time the temperature was usually somewhat raised, occasionally reaching 102° or 103°. For a few days, the child was kept under observation without any drug being administered, but owing to the rapid spreading of the eruption, Fowler's solution was prescribed in m. ij doses thrice daily, the dose being gradually increased to m. vijss. thrice a day, without any toxic symptoms being produced. Under this treatment, although crops of fresh spots appeared from time to time, many of which ran an abortive course, the disease gradually improved, the scabs cleared off, and only the pigmented stains were left, which were observed to be of a much deeper tint in cold weather. On the medicine being discontinued, a few more blebs appeared, showing that the disease was suppressed but not cured, but they all aborted when the arsenic was resumed. Dr. Vaughan (the house-surgeon) made many painstaking observations of individual bullæ, but no general conclusions could be drawn as to their natural course of development and duration, because, for example, of two fresh papules noticed on the same day, one would speedily abort

and the other perhaps run a protracted course until the scabs formed on the seventh, or even as late as the tenth day. Moreover, the observations were vitiated by the fact of the child taking arsenic all the time; but I am convinced that whilst under the influence of this drug, no fresh crops had the same vigor or vitality as the original eruption. One striking feature was noticed, and that was this, that the fresh crops did not spring up in numbers like the vesicles of herpes zoster, but when one spot has appeared and matured in a fresh situation, others appeared in its neighbourhood as tiny satellites and subsequently coalesced with the original bleb, suggesting some local method of infection, and the stains left after the bullæ had disappeared intersected one another; one or two attempts, however, at inoculation in distant situations, failed. On one occasion, hæmaturia was noticed; on another, an attack of bilious vomiting, attended with pyrexia, induced me to discontinue the medicine, but on the following day a bleb formed in the palm of the hand. Several times subsequently, when all the bullæ had disappeared and the medicine perhaps had been discontinued, a pyrexial attack occurred, and in a few days a fresh eruption of bullæ was noticed. Once the patient was sent out under the supposition that she was cured, only to return in a week's time and to remain in again several months, during which time fresh blebs frequently appeared, but they were seldom numerous, and they readily yielded to treatment—the arsenical solution being pushed sometimes to the extent of m. xvj thrice a day. When after some weeks no more bullæ had appeared, although we were led to expect them on account of febrile attacks, she was finally discharged marked with innumerable stains, and the skin tinted elsewhere with the peculiar brownish colour which is sometimes associated with the prolonged administration of arsenic.

On December 10, 1887, the child was admitted into the Adelaide Hospital (the Children's Hospital being at the time full) under my care, whilst I had charge of Dr. Verco's wards. Her condition was now truly pitiable, as there had recently been a much more extensive eruption than had ever occurred before, the body being covered with ruptured bullæ, which were discharging profusely, the abdomen especially presenting an almost uniformly excoriated surface, whilst a few unruptured blebs were to be seen on the face and limbs; there was moderate pyrexia, ranging from 99° to 102°, with great restlessness and delirium, and one was struck with general resemblance of her condition to that of a patient suffering from a severe scald. The excoriated surfaces were dressed with iodoform and boracic acid ointment, and the administration of Fowler's solution was at once commenced, in doses of m. ij. increased by December 18 to m. vijss. thrice daily. This time, however, the drug made no impression upon her, profuse diarrhœa and later on vomiting set in, and she died of collapse on December 24. Unfortunately, there was no post-mortem examination. Various drugs, chiefly combined with opium, were also administered to combat the diarrhœa and exhaustion.

The only comment I would offer on this case (and I am quite aware of the proverb *qui s'excuse s'accuse*) is, that in my opinion the fatal result was neither caused nor accelerated by the arsenic. The child's condition on admission, and the severity of her constitutional symptoms, were such as to warrant the belief that she would die from exhaustion,

if only from want of sleep, in a very short time. Moreover, she had benefited on so many occasions previously from the administration of arsenic, and in much larger doses. The other symptoms of arsenical poisoning, except the gastro-intestinal irritation, were absent; and all writers agree, apparently copying their remarks from the classical work of M. Hardy, that diarrhœa is a frequent complication, and indeed the usual cause of death in chronic pemphigus; and they have gone so far as to mention bullæ of the gastro-intestinal tract, although M. Hardy states that these have never been demonstrated to exist. He himself, however, describes redness and ulceration of the mucous membranes.

A NOTE ON THE NEW ZEALAND BIRCH ITCH.

By D. Colquhoun, M.D. Lond., M.R.C.P. Lond., Dunedin.

In April, 1888, while staying a few days at Lake Te Anau, Mr. Richard Henry, who has lived in the district for many years, spoke to me about birch itch. Mr. Henry has worked at the natural history of the locality for many years, and has had to spend a great deal of time in the bush, much of which is composed wholly of the New Zealand birch (really a beech). The disorder was a new one to me, and none of the medical men to whom I have spoken of it could give me any information about it.

Mr. Henry has given me the following account of his experience of it:—"I made acquaintance with the birch itch while camped on Manipouri plain, eight years ago. At first I attributed the intense itching to the after-effect of sandflies, but I soon found I was wrong. On parts liable to friction from the saddle, or while working, I felt the itch most severely—the ankles, toes and wrists, and especially the parts between the thighs, itched most intolerably. I heard of birch itch, and suspected I had caught it. I consulted an old resident—a run-holder—who I heard was afflicted with it every summer that he remained in the district. He told me that it always left him when he went to town. I tried to cure it with kerosene, turpentine, painkiller, and sulphur ointment, all to no purpose, because I had allowed it to get a good footing, and had not persevered enough with the sulphur. During the day I was comparatively at ease, but at night, when I went to bed, the itching was something horrible, so much so, that on one occasion I got out of bed at 11 o'clock at night, and plunged into the creek. This gave me relief and a clue to a speedy cure, which I attained by the application of dry sulphur and frequent bathing. Now I get several attacks every summer, but with the above treatment it causes me no inconvenience. Only about one person out of every ten is ever attacked, even when they are working and living together; and while one may be attacked exclusively on the limbs, another may be so on the body. Many people deny that it is caused by a parasite, but maintain that it is in the blood, and can be cured by change of air and diet; but I cure it several times every year, and last year I watched

it so closely, that it only succeeded in forming one little spot on my ankle, which was a great contrast to my experience of 1880. I am most liable to it in very dry weather, when about rotten wood, or among the peat moss. I also suspect that it attacks horses and dogs in a slight degree. My first notice of it is an indefinable and unlocalisable impression of something moving on the skin. On looking at the place the skin seems redder, which may be caused by friction, and there is always present black dust of various shapes and sizes, a supply of which must be in the clothes, for no matter how often I brush it away it is there again. This dust I take to be the parasite or spore, and that not one in a thousand penetrates the skin; but that when one does so it irritates a large surface, because after a few days a pimple comes out here and there, but nothing in proportion to the surface irritated. A slight hot itchy feeling is always present, but periodically more intense, especially in the evening. On one occasion I was on an expedition without sulphur, and caught the itch on my ankles. I put away the socks I wore for a week or two, and then put them on again, when I felt the itch again, which must have remained in the socks all that time. I am almost certain that horses suffer from it, but as it causes no loss, it is taken no notice of.

"It has been cold and wet weather here lately, and unfavourable to my chance of getting specimens or scrapings; but for several days I felt the itch slightly, and have collected all I could of what I think you want for specimens."

Two gentlemen from Sydney University spent some time last summer at Te Anau. One of them contracted the disease, and the other did not. Professor T. was good enough in answer to my enquiries on the subject, to send me the following account of his experience:—"The symptoms are very simple. The skin round my ankles became red just where it was rubbed slightly by my boots. The irritation was very intense, especially the first thing in the morning. I rubbed the place affected with vaseline and flowers of sulphur. In about a week I thought I was right, and gave up using the sulphur, but the trouble recommencing, I had to take to it again, and was not finally right till I had taken advantage of the sulphur springs at Taupo for several days. I used to keep my legs in the mud among the deposit of ferrous sulphide. Professor S. was not attacked; we lived exactly the same life, except that I went a great deal more into the bush. My own impression is, that the disease is possibly connected with the ring of deposit of *débris*, which always formed inside the top of one's boots."

J. W., a farmer, aged 60 years, consulted me in July 1888, for eczema of the face and some other troubles. He had lived for many years near Lake Wakatipu, and had a good deal of experience of birch itch. He said that he had been working among birch for years, without being affected by the itch. On one occasion he had to clear a track through the bush, and spent some days tearing up young birch trees. He had then a severe attack of itch about his fingers and face. Afterwards, he could not enter a birch forest without being attacked by the itch. This, he said, was a general rule—once attacked, a man is always liable to it.

He thought it was most easily acquired in Spring, but was also troublesome, to those sensitive to it, at other times. It was most troublesome when the birch was much handled, especially if wet. He

had seen it mostly about the fingers, but it also attacked the face and body, if neglected. It nearly always goes away on removing from the neighbourhood of birch forests, but as most people use sulphur internally and externally as well, its cure may be due to this treatment.

I have not seen any cases during the acute stage, but in the stage of recovery the condition is such as might be found from many kinds of skin irritation. I examined the scrapings sent to me by Mr. Henry very carefully, but could find nothing but epithelial *débris*, and small fragments of vegetable tissue. The cause of the disorder is therefore still to be sought. It may be a vegetable poison, like the poison oak or dogwood of the United States, or it may be an acarus. In the absence of definite proof in any direction, it is useless to discuss hypotheses, and I put these cases on record in the hope that some of us who practise in New Zealand may have the opportunity of examining patients in the acute stage, and of studying the disorder where it occurs.

ON SOME CASES OF ALOPECIA AREATA, AND ITS PROBABLE CAUSES.

By D. Colquhoun, M.D. Lond., M.R.C.P. Lond.

Lecturer on the Practice of Medicine, University of Otago, New Zealand.

The question of the causes of tinea decalvans or alopecia areata, is raised from time to time, but cannot be said to have been satisfactorily settled. The following cases are offered for consideration, as a contribution towards the discussion of the subject :—

W. F. M., aged 26 years, a strong athletic young gentleman, consulted me in October 1887. He had previously been under my care for rheumatism, from which he had entirely recovered. A few weeks before seeing me, he had noticed a bald patch by the side of his head, and when I saw him he had three well-defined and characteristic patches of alopecia areata on the scalp behind the ears. His health at this time was as usual excellent. I examined scrapings from the skin and adjacent hairs with the microscope, but failed to find any parasite. He recovered in the usual way, after the application for some time of cantharides. Since then, he has had another attack of alopecia, which yielded quickly to the same treatment.

His family history is the chief point of interest in this case. His mother died of Bright's disease, aged about 50 years. His father has for many years suffered almost constantly from psoriasis of the face and neck (the condition of the neck would be better described by the term ichthyosis). A sister, aged 15 years, has been under my care for seborrhœa of the head, and psoriasis, and also for alopecia areata. A brother, aged about 24 years, residing in Sydney, had about the same time alopecia, involving nearly all the hairy surfaces. A brother, aged 17 years, residing in Dunedin, had several patches of alopecia areata on the scalp. A sister, aged 21 years, has had frequent and severe attacks

of chlorosis. His grandfather and great grandfather were subject to severe attacks of gout, which in its ordinary forms has not attacked any of the living members of the family. All the brothers and sisters were as a rule healthy and vigorous, but they were all distinctly of the neurotic type.

Joseph R., aged 7 years, was brought to me on August 9, 1888. He had then three patches of alopecia areata on the parietal and occipital regions of the scalp. These had existed for about three months. His general health was fair. He had an attack of pleurisy at about the time of their first appearance, from which he made a good recovery. No accurate family history could be obtained, but his mother had suffered from eczema of the hands off and on for many years.

Miss N., aged 22 years, consulted me in October 1888. She had then two patches of alopecia areata, situated symmetrically behind the ears, at about the margin of the hairy scalp. She had to leave England some years ago on account of severe attacks of bronchitis every winter, and suffers much from neuralgia of various branches of the fifth nerve. There is a history of phthisis in the family, and her mother informed me that many of her relations suffer from gout, but so far as she knows, none of them have ever had skin disorders of any kind. Except for the tendency to bronchitis, the patient although delicate and easily tired, is of fairly sound constitution.

At the International Medical Congress held in London in 1881, a discussion on the causes of alopecia areata was introduced by Dr. Liveing, who said that a belief in the parasitic nature of alopecia areata was still widely entertained, and stated that the theme of his paper was, that the clinical features of the disease cannot be explained on the parasitic hypothesis. He called attention to the great tendency of the disease to recur, to its slight yet notable tendency to appear in different members of the same family, and to its association with nervous disturbances. In the discussion which followed his paper, the balance of opinion was against the parasitic theory, and some striking instances were given of the association of the disease with various neuroses. On the other side, Dr. Vidal of Paris, Professor Hardy of Paris, and Dr. Thin of London, adhered to the parasitic origin of the disease, at least in some cases, and cited examples. Professor Simon, of Breslau, thought the examples of contagion adduced might be explained on the hypothesis, that there are two distinct diseases with the same general features—one a trophoneurosis, the other a contagious disease.

Dr. Pye Smith, writing in "Fagge's Practice of Medicine" on the subject, says that he has no doubt the disease is not parasitic nor contagious, and that he can see no sufficient evidence that it is a trophoneurosis.

In the discussion mentioned, no special attention seemed to have been given to the association of alopecia areata with other skin disorders, or with gout. The influence of gout, in producing irritable mucous membranes and skin troubles, is well known. That it has this effect through the medium of the nervous system is probable, and I am inclined to think that in two of the cases I have cited, the alopecia areata may have been due to ancestral gouty taint. In the case of the child, there was no evidence of gout in the family. Here the only

possible co-related disease, ascertained to have existed, was the eczema of the mother, which may or may not have been gouty.

In all the cases I have mentioned, I think the parasitic theory may be excluded, and that the disease was due to some inherited predisposition is particularly plain in the M. family; in the case of the brother who was suffering in Sydney from alopecia, while his brothers and sisters were attacked by it in Dunedin. Although I detected no special anæsthesia in any of the cases, they were all very tolerant of cantharides.

There is still sufficient doubt as to the actual cause of the disease, to make it worth while inquiring in such cases, as to the occurrence of other skin disorders in the same individual or in relatives, and as to gouty predisposition. In the meantime, it seems to me that the evidence points to the disease being one of disordered nerve function, and that to describe it as a trophoneurosis is convenient, and probably correct. We must, however, look to increased accuracy in describing and recognising minute changes in the peripheral and central nervous system, for an exact pathology.

NOTES ON SOME SKIN ERUPTIONS COMPLICATING URETHRITIS.

By R. A. Stirling, M.B. Melb., L.R.C.S. Ed.

The balsamic eruptions which head the list have been omitted, although I find that in notes of over 1000 cases, treated both in dispensary and private practice with copaiba or cubebs, there were no less than 160 who showed the well-marked papulo-erythematous blotches, bright red in colour and very irritable, with the copaiba odour of the skin.

Santal oil, although it produces the backache and gastric derangement common to the action of all these nauseous drugs, has, in my experience, in only one instance been responsible for a rash on the skin. The patient was suffering from the arthritic form of gonorrhœal rheumatism at the time, in both knees and one ankle-joint. The rash consisted of rings of a rose colour, about half an inch in diameter, not attended with itching, nor any perceptible elevation of the skin.

Apart from these medicinal eruptions, I have seen, on a few rare occasions, a form of acute eczema, which was coincident with the gonorrhœa, and which seems to bear out the supposition that the absorbed poison not only attacks the joints and other serous structures, but at times may, in certain constitutions, expend its effects upon the skin. The following history of a case of acute erythematous eczema is an example of idiosyncratic dermatitis:—

Mr. D., æt. 24, robust and healthy, consulted me in November 1887, suffering from a first gonorrhœa, and was ordered a mild alkaline mixture and injection. About a week after its onset, he noticed round the pubes a diffuse redness, not itchy, but weeping copiously, and extending up the

trunk to the level of the ensiform cartilage, and down the front and inner surfaces of the thighs. He had never suffered from skin disease before. There was no trace of scabies or pediculi, nor any history of gout or rheumatism. The extent of the eruption and its position forbade one to attribute it to the irritating effect of the discharges. Under exclusively local treatment, as recommended by Balmanno Squire, the disease disappeared, after lasting about ten days, the treatment for the urethral trouble being continued at the same time.

In October of this year (1888) he again contracted a discharge, and within a few hours of its advent, another attack of eczema, which was much more prolonged and extensive than before.

Cases of fugitive erythema are not infrequently met with in those who have been treated from the first by injections. They have one distinguishing feature from the dietetic and medicinal rashes in this—that they occur in successive crops. Papular eruptions clustered together upon a very slightly inflamed portion of the skin, and due possibly to the depressing influence of the disease upon the nervous system; for in the cases noted, I have remarked that the persons were of a highly neurotic temperament. Gonorrhœal lichen is distinguished from the ordinary disease by the itching being much less severe, and by being circumscribed, with well-defined outlines. It is, perhaps, most often found in those suffering from a chronic gleet, and broken down in constitution; and a very favourite seat is the front of the abdomen and chest. These eruptions are not to be mistaken for those produced by woollen clothing, from which they are quite distinct, as I have at times found them on the forehead and limbs.

Finally, I may draw attention to the very rare but occasionally undoubted cases of gonorrhœa-syphilis, first described by Hutchinson—cases where, without urethral chancre, or any evidence of chancre elsewhere, but with merely a mucous or muco-purulent blenorrhœa; where, even with minute endoscopic examination, nothing in the shape of a specific lesion can be discovered, and in which, unattended by bubo or other adenopathy, the disease runs the ordinary course, attended with cutaneous manifestations not distinguishable from the well-known syphilides.

Since writing the above, I find that M. Mallet, in the *Revue de Médicine* (1886), has written an able article on the subject of cutaneous diseases in gonorrhœa. He rejects the pyæmic and reflex theories of the origin of gonorrhœal rheumatism and skin eruptions, and argues strongly in favour of the absorption of a specific gonorrhœal virus, which, in the light of the discovery of the gonococcus—not only in the urethra and its discharges, but also in the synovial membrane of inflamed joints—seems to be the most likely explanation. Mallet classifies three groups—

(1) Eruptions closely resembling scarlet fever or measles, coming on late in the decline of the disease.

(2) Rashes described as those of polymorphic erythema.

(3) Purpuric patches.

NOTES ON A CASE OF LEPROSY.

By F. PEIPERS, M.D.

M. A., æt. 30, native of Sydney, of Jewish descent; no hereditary taint of skin disease known. Five sisters and two brothers living, who have not evidenced any disease of the skin. From his eighth until his fifteenth year he lived in New Zealand, and then left for Melbourne. In 1878, he acquired gonorrhœa. In 1879, after suspicious connection, he had a feverish disease for three weeks, which was called typhoid. Soon afterwards, there was fever and pains all over the body, swelling of the face, nose, ears, feet, &c. There were red inflamed spots on the dorsum pedis. At no time had he ulceration on the penis, or parts thereabouts. At that time his disease was pronounced to be syphilis. After that he was under specific treatment of every kind by several practitioners, including mercury on seven occasions. When iodide of potash was given, the symptoms were exaggerated. Arsenic, iodoform and sarsaparilla were given in large quantities. The local lesions in the throat and tongue were treated by argent. nit. and hydrarg. nit.

On examination, I found the hair on the head black, strong, with scalp visible at vertex. On the forehead, particularly on the right side, there were a number of swellings, large and small, varying from the size of a three-penny bit to a florin. The swellings did not penetrate to the osseous structures beneath. The elevations presented an umbilicated appearance, and were raised somewhat distinctly at the edges. The epidermis between the swellings was apparently healthy. There was no ulceration about the forehead, but a peculiar oily brownish appearance of the diseased parts was observable. Similar tumours existed on the ears, cheeks, lips and nose, forming together a general enlargement and disfigurement of the face—in fact, constituting the true typical facies leontina. Some of the masses were ulcerated. On the arms, wrists, legs and hands particularly, the same state of things was to be seen. The skin on the fingers and toes was very much ulcerated, in parts laying bare the tendons. Remarkable symmetry was exhibited by the disease in both hands, and in the feet too. A deep brownish discolouration, sharply defined from the healthy skin, was to be observed on both sides of the sternum, extending to a line corresponding with the umbilicus.

The tongue showed at the tip a flat ulcerated surface, in size about that of a sixpence. Deep fissures, intersecting, covered the tongue. The uvula was almost entirely obliterated. A deep fissure extending into the pharynx on the left side of the uvula was clearly distinct. A localised anæsthesia seemed to be present in the left thumb. The internal organs, as far as is known and could be traced, were apparently healthy.

Since 1885, and up to the present, his appearance has greatly changed, the swellings in most parts having entirely gone. Large cicatrices now cover the forehead, cheeks, ears and nose, some of them contracting to such an extent that difficulty is found in opening the mouth. Part of the nasal septum has been destroyed. Anchylosis is taking place in some of the finger-joints. An alteration in the

character of the skin on the chest and abdomen has taken place. However, on the back a similar discolouration is now evincing itself. Unfortunately, the condition of things in the throat appears to be tending towards a worse state. It may be mentioned that an anæsthetic state is being developed in the inferior extremities.

The diagnosis is somewhat open to discussion; but considering that, firstly, the bones have not at any time been affected, excepting the nasal septum; secondly, the absence of improvement under strong and repeated anti-syphilitic treatment; and thirdly, the decided change for the better from the exhibition of other remedies, we are precluded from considering the case as one of syphilis in any form. What is the disease then? The appearance of the patient, allied with the changing symptoms, indicate leprosy.

He was put under arsenic and quinine, combined with chaulmoogra oil. No improvement following, he was then put on ichthyol, with almost immediate effect. Soon after, the supply of this remedy ran out, and at once it was noticed that the symptoms became worse. He is now under the influence of ichthyol for two years, on and off. A singular feature about the drug is the disagreeable symptoms suffered by the patient should it be suspended for a few days, a distinct exaggeration of the disease, occurring.

The markedness of the symptoms in this case, peculiar as they are to a disease so far unknown amongst any but Orientals in Australia, renders it one of a highly interesting nature. The success that has attended the use of ichthyol in this case is very suggestive, however incomplete in its results, in a disease which at all times has presented such intractability to any and every form of medication.

A CASE OF ICHTHYOSIS

By J. P. Ryan.

Chevalier of the Legion of Honour.

Surgeon to the Skin Department of the Melbourne Hospital.

Surgeon to the Victorian Eye and Ear Hospital.

Lesser, in "Ziemssen's Cyclopædia of Medicine," defines ichthyosis as a disease characterised by hypertrophy of the epithelium, with deposit of pigment between the lamellæ and elongated papillæ, and without change in the corium, beyond pigmentation of its superficial layers. Malcolm Morris defines it as a congenital hypertrophic disease of the skin, characterised by increased growth of the papillary layer, with thickening of the true skin, and the production of masses of epidermic scales. I think a majority of dermatologists will differ with him about thickening of the true skin. Most generally it makes its first appearance within a year of the child's birth, though it may

be delayed to the third or fourth year. It is frequently hereditary, and by most authors it is looked upon as incurable. Tilbury Fox makes out four degrees of it:—

(1) Xeroderma, its least expressed form, where the skin is rough, hard, and dry, with a tendency to furfuraceous desquamation.

(2) I. nacrée, or nitida, in which the scales are large (mother-of-pearl like), and arranged in little polygonal patches—the true fish-skin.

(3) In this variety, the epithelial accumulations form little square masses, somewhat dark in colour, from exposure to dirt, or from pigmentation.

(4) I. hystrix, or spinosa, the papillary ichthyosis of Dr. Copeland, in which the epidermis is greatly hypertrophied, and forms a "series of closely packed horny mobile excrescences, which are usually of a dark olive-brown colour" (B. Squire), the discoloration being partly due to increased pigmentation, and partly to dirt. The so-called "porcupine men" were affected with this variety.

The disease may be local or general. In either case there are parts, as the front of the knees, back of the elbows, ankles and axillæ, which it favours. Even when general, according to Balmanno Squire and Tilbury Fox, it avoids the palms, soles, eyelids, flexures of the joints and genitals.

In the case which I am about to bring under your notice, the disease displays itself mainly as ichthyosis hystrix, though some of the patches, such as those which occur about the elbows, wrists and ankles, belong to the third variety described above.

H. F., 5 years old, is a fairly well nourished, and, excepting for the skin disease, a healthy boy. At birth he was clean skinned, like the other children of the family, and there are ten of them. He was vaccinated when 4 months old, and it was only towards the end of the first year that his mother noticed what appeared to be a patch of dirt on the back of his neck. It began to thicken and grow, other patches came out on various parts of the body, and in a few months the condition of the eruption, and its arrangement, were almost the same as they now are.

The family history is good. The father and mother and the other children are healthy; the grandparents on either side have not suffered from any chronic skin complaint, nor is there any history of syphilis. The boy's hair, nails and skin, excepting only the affected localities, are normal in appearance, but behind both ears are scars, which his mother states were caused by lumps, which he had there when he was two years old, having been lanced by a medical man. The disease for the most part affects the left half of the body, for on the right side are found only a few brownish stains on the ribs, and some thick scaliness about the elbow, back of hand, below the knee, and about the ankle and instep.

The distribution of the disease on the left side is as follows:—On the back of the neck, touching the mesial line, is a patch of I. hystrix, about two inches square, connected by lines of dull coloration, and some roughness on the side of the neck, with two smaller patches of the same in front just above the sternum. A mild form of the same affects the front part of the shoulder and axilla. There are some streaks of

CASE OF ICHTHYOSIS

(DR. J. P. RYAN'S PAPER.)

dull brown colour on the back; a series of curved streaks on the lower ribs, the convexities directed downwards, and some vertical streaks on the flank, groin, and side of scrotum, where the roughness and papillary hypertrophy are more apparent. This is continued along the perinæum and between the buttocks. Then occupying the lower part of the left buttock is a large irregular patch of very pronounced I. hystrix, ending in the upper third of thigh, but joined by a streak of discoloration to another elongated patch of the same kind crossing the popliteal space, and terminating near the middle of the calf. There is also a little roughness and discoloration on the front of the knee, on one shin, and about the ankle. There is not, nor has there ever been, heat, itching, or other local irritation.

It will thus be seen that, in the subject under notice, the disease presents itself under three aspects, viz., (1) as dark brownish staining, undoubtedly due to deposit of pigment; (2) as little squarish slightly raised scaly masses; and (3) as ichthyosis hystrix or spinosa, so graphically described by Neligan. He says:—"The affected surface presents a singular and remarkable aspect, being of a greenish-brown colour, and so hard as to feel like horn, and to produce a grating noise when the hand is passed quietly over it, yet more or less elastic and yielding when pressed. The diseased epidermis is firmly adherent to the derma, and if attempted to be torn off with the nail, the part on which it is attached bleeds, and is painful. The spiny elevations may be separated from each other, when it will be seen that they are of a greyish or yellowish-white colour."

He has been under the care of several medical men, but he has never received any benefit from medication. I employed inunction with chrysophanic acid ointment (gr. xx. to ℥j) on a few of the less developed patches, but apparently without benefit. I therefore determined upon trying a more radical mode of procedure, and Dr. Lalor, of Richmond, having administered chloroform to the boy, on December 20 I operated on the patch occupying the popliteal space. I first removed with a curved scissors the spinous-looking outgrowths; then I removed the skin in its entire thickness from the upper half, and with a Volkman's spoon thoroughly scraped away the affected tissue from the lower half of the patch. The result, so far, appears to be favourable. The wound, as you see, has healed, and the scar is not very formidable looking. I propose to deal later on with the other patches by erasion alone, which I think will be sufficiently effective, and the scarring from which will be very slight.

Dr. G. A. Syme, who kindly examined under the microscope some of the affected tissue, reports of it:—"A vertical section shows great hypertrophy of the horny layer of the epithelium; there is hardly any change in the papillæ or hair sacs, and no sebaceous or sweat-glands were found." An examination of a horizontal section showed the same appearances.

There are some points of exceptional interest about this case. First, it is evidently not hereditary, none of the relations on either side having ever had anything similar to it. Then it is found for the most part upon the left half of the body, and is closely associated with the distribution of certain nerves, viz., cervical, intercostal, ilio-hypogastric, ilio-inguinal, and lesser sciatic. The flexures of the joints and the

genitals are affected, which is unusual; and the skin, excepting only where the disease is found, is perfectly normal in appearance and in function. Pigmentation is a marked feature, and in some places forms the only factor of the disease.

Recovery is very rare. Only two cases are reported by Hebra, one of which disappeared after an attack of measles, the other after variola. Neligan records three cases in children under eight years, in whom the disease was confined to the extremities, which recovered under the use of alkaline baths, and the internal administration of iodine and iodide of potassium. The record is unsatisfactory; it leaves us in the dark as to the phases under which the lesions presented themselves, and therefore we do not know if the disease was mild or the reverse in character.

I do not know if the treatment which I am pursuing has been employed by others; at all events, I have not seen any account of it.

SECTION OF DISEASES OF CHILDREN.

PRESIDENT'S ADDRESS.

By W. Snowball, M.B. et Ch. B. Melb., L.R.C.S. Ed.

Surgeon to the Melbourne Hospital for Sick Children.

On Intestinal Troubles in Children.

Gentlemen, In choosing the title intestinal trouble in childhood as a subject for discussion at this meeting, I have been influenced by the fact, that of all children's troubles, abdominal ones are in this country the most frequent, and I am sorry to say in many cases the most unsatisfactory as regards the result of treatment. Of all children's complaints at this period of the year, the most frequent and most fatal is the gastro-intestinal. In fact, it may with justice be looked upon as an epidemic, or rather if I may be allowed the expression, as an epidemic of sporadic cases, for as yet there does not appear to be evidence that the cases have any direct power of contagion. In this, our climate is more like that of the American towns, where, in the hot period of the year, the same condition seems to exist among the children, specially in the cities, that we find here.

The principal factors in the production of these complaints are heat, hygiene (or rather the want of it), food, age. Certainly, high temperature plays the most important part in this direction, not only tending to produce febrile disturbance in the child, but also tending to cause fermentative changes in the food, in the case of an artificially-reared infant. Though in hot weather all places are more or less subject to a visitation from the complaint, the crowded towns are most subject, next come inland places, especially if flat and badly drained. The mountainous parts, and places close to the sea shore escape the best, though some of our over-crowded seaside suburbs are specially subject to it.

Food.—As in the case of most other ailments, artificially-fed children are more prone to be attacked, than are those who are reared on breast milk. This is due to the facts, that these children appear to have weaker vitality than the nursed ones, and so have less resisting power against disease; and also that their food is more liable to fermentative changes than is breast milk.

The age most affected is under two years, that being the period of greatest activity in the intestinal glands, which, being in a state of unstable equilibrium, are more likely to be disordered than at a later period.

Any part of the alimentary tract may be affected. Generally the stomach is involved, and in some cases the disease does not appear to extend further, the case either recovering or dying from exhaustion before the bowel is affected. Next comes the small intestine, and, in the more protracted cases, the most definite lesions are situated in the ileum, especially near the ileo-cæcal valve.

The symptoms vary with the part of bowel affected and with the stage of the disease; one point of interest being that as in intussusception, the higher up the lesion is, the more probably will there be more or less complete suppression of urine.

The terminations of the complaint, are in favourable cases, recovery without any sequelæ, beyond intense weakness. In others, the supervention of that condition of asthenia known as spurious hydrocephalus, or the hydrencephaloid disease of Marshall Hall, where all the symptoms of tubercular meningitis are present, except that the heart is feeble and uncertain in its action, the extremities are cold, the fontanelles depressed, and passive cerebral effusion may take place from venous stasis, due to want of propelling power of the heart. Another class of case terminates in uræmia. Here you find the diarrhœa and vomiting ceasing. Nourishment is taken eagerly, but the urine is nearly suppressed; generally, muscular twitchings set in, sometimes violent convulsions, amidst which the patient sinks. One of the most common of all terminations is that condition of ill-health known as marasmus, popularly called consumption of the bowels; which, though widely different from tabes mesenterica, presents all the symptoms of it, except that the mesenteric glands, instead of being enlarged, are generally more or less atrophied.

As regards treatment, during the last twenty years it may be divided into three different epochs, the first being the eliminative period, when the endeavour was to evacuate the materies morbi by means of purgatives; the second, when sedatives played the most important part, and when at all hazards it was sought to arrest the peristaltic action by means of sedatives and astringents; and the third, which exists at the present time, that of antisepsis, the materies morbi being killed, if possible, by the introduction into the system of the various germicides. Possibly all are more or less right, and the happiest results will be obtained by a scientific combination of all three methods.

The method I usually adopt for a case of gastro-intestinal catarrh, if seen in the early period, when the temperature is high, and gastric symptoms are most prominent, is to put the child in the coolest and best ventilated room in the house ; if possible, keep the temperature of the room down to 65°. Wrap the child in cold lotion to lower the body heat, and stop all food except iced rice water, and iced brandy and water, in small quantities, given frequently ; if the child is at the breast, recommend that the breast be emptied by pumping before the child is put to it, so that it may have the comfort of sucking the nipple, without the irritant of the mother's milk, which in these cases is more than the stomach can bear. As for drugs, I have most confidence in minute doses of calomel, say gr. $\frac{1}{12}$, repeated ever hour till a grain has been taken ; if that fails, creasote and hydrocyanic acid in hourly doses, for from six to ten hours, and my experience is then that either the child is better, or else that the disease has progressed, and that intestinal trouble has commenced, as shown by the frequent, watery, foul-smelling motions, with considerable pain. I then use one of the liquid bismuth preparations, with liquor hydrarg. perchlor., and if there be any sign of heart failure, an occasional dose of digitalis. If the symptoms do not then abate, but purposeless straining comes on, with the passage of mucous stools streaked with blood and great tenesmus, I apply belladonna over the bowels, at the same time giving one of the insoluble bismuth salts, such as the subnitrate, with full doses of opium, at same time giving injections of various astringents with sedatives, the diet at this time consisting of raw albumen, raw meat juice, and brandy. If in spite of treatment the case goes on to the hydrencephaloid state, I wrap the child in brandy and oil, apply mustard to the heart, give stimulants, such as spirit. ammon. aromat. and digitalis, and æther, or camphor. In the uræmic cases, I have nothing more useful than small doses of pilocarpine, say $\frac{1}{12}$ gr., with digitalis and warm mustard baths. If the case goes on into marasmus, the changes may be rung on all the various digested and soluble foods, with varying amount of success.

But, in all stages of the complaint, the two main features for a successful issue are—removal to a healthy locality, and the stoppage of all food that requires any digestion. Milk, no matter of what kind and how prepared, whether human, whether peptonised, does positive harm in the early stages.

GASTRO-ENTERITIS IN CHILDREN: SOME POINTS IN PATHOLOGY AND THERAPEUTICS.

By D. Collingwood, M.D.

This name may be used to indicate a class of diseases, the widespread prevalence and importance of which are my excuse for asking your patience for a few minutes to-day. Those of us especially who are connected with institutions where children are brought into the world, reared, or where their diseases are treated, must all feel that in this section, more perhaps than in any other, the value of an interchange of ideas cannot be over-estimated.

Classification.

Of diseases of the gastro-intestinal tract we may make a classification as follows:—Acute gastric catarrh, chronic gastric catarrh, dyspepsia, acute intestinal catarrh, chronic intestinal catarrh, cholera infantum, dysentery or ulcerative colitis, tubercular enteritis, parasitic enteritis.

I do not propose to attempt to travel over so wide a range of material as this classification offers, but selecting from it that which appears to me to be the most prevalent form in these colonies, I wish to offer a few remarks on what I may call gastro-enteritis.

Ætiology.

Amongst predisposing causes we have season, age, locality, heredity and social condition; and undoubtedly here, as in England and America, summer, especially the earlier and later months, is the period of the year when the disease amounts almost to an epidemic. Hot damp weather is certain to be followed by a large increase in the number of our gastro-enteric patients; and most of all so when the nights are muggy and hot—when even healthy children are broken in sleep.

High barometric pressure would seem to have some influence, especially when associated with excessive moisture in the atmosphere, more so than high thermometric indications.

Locality and social conditions may be taken together. Overcrowding, inefficient hygienic surroundings, filth, bad ventilation, &c., are the outcomes of cities and poverty, and potent are their evil influences upon the infant exposed to them, both as predisposing agents and as direct exciting causes, because for similar reasons the feeding of such infants is as bad as the hygiene.

Heredity is not usually introduced by the text books as a predisposing cause, but apart from the influence of surrounding conditions to which the children of such parents are exposed, the propagation of their species by ill-nourished, strumous, dyspeptic parents, must necessarily produce beings with prejudiced alimentary mucous membranes, and ill-acting absorbent and glandular systems.

Of direct exciting causes, bad feeding comes first. Let me divide this into two classes: (1) the character of the food, (2) the method of feeding. No one who has taken the trouble to look over his case book can have failed to notice how comparatively rare gastro-enteric disease is in the nurslings of averagely-healthy parents, how enormously

it preponderates in hand-fed children; so that one is compelled to the conviction that all hand-feeding, however well-directed, is bad.

Next to hand-feeding as a direct cause, I should place too early and too late weaning, and afterwards injudicious irregular nursing or the insistence in nursing of mothers whose own condition of health unfits them to produce healthy nourishment for their infants.

In hand-feeding, amongst bad foods must be placed sour milk, an undue preponderance of farinaceous starchy foods, excess of sugars, meat at too early an age, excess of fats and butters, scraps of adult food.

By faults in the method of feeding, I mean in nursing, that want of regularity which it is so hard to persuade mothers to avoid—the yielding to the temptation to put the child to the breast whenever it cries; and in hand-feeding, the same irregularity, as well as the want of scrupulous cleanliness.

Amongst other exciting causes, we have cold, through insufficient clothing in weather when perspiration is constant; acute diseases, especially the exanthemata.

SYMPTOMATOLOGY.

There are usually some premonitory symptoms of these complaints, lasting over two or three days. They consist of restlessness, fretfulness, disturbed sleep, the infant waking with short fits of crying, pallor of the face, heat of the head, impaired appetite, and obvious discomfort after food.

The actual attack is ushered in with vomiting and purging, usually in this order:—The vomited matters consist of the contents of the stomach from the last meal at first, and bile afterwards, when the stomach has been thoroughly emptied by repeated retching attempts. If milk has been taken, it is rejected in sour, very acid masses, consisting of curd, often in the shape of lumps as big as a walnut, and of very tough consistence. The stools are frequent from the first, and painful or preceded by pain. Their number varies from half-a-dozen to twenty or more per diem. In the early stages they are semi-solid, homogeneous, yellow in colour, and neutral in reaction. Soon they become more liquid and green; and later still, they are acid in reaction. They may then become heterogeneous, greenish with admixture of particles of yellow fæces, and neutral in reaction; or green and acid, with flakes of yellowish-white caseine. Further, they may, and usually do, vary from hour to hour, both in colour and consistence. Mucus or blood, or both, are usually present in the later stages. Sometimes, and this is in very severe cases, the character of the stools approximates to that of cholera infantum—liquid, watery, and almost colourless; in such, these stools may be passed without any straining, but, in moderate cases, tenesmus is a marked symptom.

The tongue is dry, clean at the tip and edges, furred thinly over the dorsum. The fur becomes thicker as the case proceeds, and in severe cases the tongue becomes dry and brown. There is great thirst, the child obviously craving for cool drinks. Appetite for solid food is lost more and more.

The abdomen is at first distended with flatus, and eructations are frequent and sour-smelling. There is often some tenderness on

palpation from the first. In the later stages the belly is flat, sometimes retracted, always flaccid.

The temperature is raised from the first—102° to 103° F. on the average, with slight morning remissions. As the case proceeds, these remissions become more marked, and then perspirations take place. In the last stages of some cases, great variations of temperature are noted.

The restlessness which was present from the first continues throughout the case. It increases when there is a tendency to convulsions; the head is then rolled from side to side; slight twitchings are noticed, perhaps some strabismus and sluggishness of the pupils, culminating in an attack of convulsions, unilateral or general.

The pulse always runs high, and early shows signs of weakness.

Respiration is affected, as in pyrexia from whatever cause. A short sharp cough of peculiar character is a frequent accompaniment of the attack from its earliest stages, especially in cases where the gastric symptoms are the most prominent.

The urine is diminished in quantity, high-coloured, and irritating to the skin. It is passed only two or three times daily.

The general tissues are speedily affected, the roundness of the face is lost, the limbs become soft and flabby, the eyes sunken and surrounded by dark rings, the conjunctivæ lose their brilliancy, and the "nasal line" is deepened. The position taken by the patient shows languor and weakness, a disinclination to move or be moved, but the onset of restlessness is an unfavourable sign.

The skin of the buttocks and thighs soon become excoriated by the acid stools and concentrated urine; the skin of the body, especially the abdomen, is dry and harsh.

The progress of the case towards recovery is first marked by the cessation of vomiting, by improvement in the colour, and diminution in the frequency of the stools, increase in the quantity of urine passed, and a re-gain, in cases of short duration, of flesh and strength, but little less rapid than their loss was.

When the symptoms tend towards a fatal termination, convulsions may occur; at other times, drowsiness comes on, possibly uræmic in character, persistence in refusal to take food, coldness creeping up the extremities, and sometimes the cessation of active symptoms, such as vomiting and purging.

Morbid Anatomy and Pathology.

The primary lesions consist of hyperæmia of the intestinal mucous membrane. The position in which this hyperæmia is greatest varies in different cases; and as is usual in catarrhal diseases, the evidences after death do not by any means correspond with the severity of the symptoms, especially if the duration of the case has been short. The lesions occur in patches, frequently over the whole alimentary canal, but most commonly and intensely in the ileum and colon, and especially at the ileo-cæcal valve, and in the sigmoid flexure. The mucous membrane is reddened, softened, and swollen, the hyperæmia shows up in arborescent patches about the follicles and patches of Peyer, which stand out above the surface, and are marked with dark red spots. The arborescent injection is very visible from the peritoneal surface.

In cases which have gone beyond the acute stage, the mucous surface is frequently abraded about the solitary gland and patches.

The lesions found in the stomach do not by any means always correspond with the severity of the disease, as shown by its symptoms during life ; the explanation of this fact may depend partly upon the greater irritability of the gastric mucous membrane in children, and partly upon irritability reflected through the sympathetic nerve plexus from the intestines. It has been suggested also that the swollen condition of the mucous membrane forming the ileo-cæcal valve, frequently so great as almost to occlude it, may have a direct agency in the causation of the vomiting.

The morbid condition of the contents of the intestine is of interest. An excess of secretion of mucus is of course present in all cases, and the reaction of the contents of the small intestine, instead of being alkaline, is found to be acid. The colour too of the contents of the healthy small intestine is a bright rich yellow, or orange, but in this catarrhal condition it becomes green. The explanation of this change of colour depends upon alteration in the biliary colouring matters. We know that these are the parents of the colours in healthy fæces, and it has been shown that bile exposed to air, or to the action of an acid, changes colour by the bilirubin becoming biliverdin. This is seen in the ordinary so-called bilious vomiting, when bile regurgitates into the stomach, and is exposed there before being rejected to the action of the acid gastric juice.

Similar conditions are present in these cases ; the intense acidity of the material passed down into the intestine from the stomach—partly the result of the increased acidity of the gastric secretion, and partly the result of acid fermentation—proves too much for the alkalising powers of the bile and pancreatic juices and succus entericus, so the action of the acid contents changes all the bilirubin at once into biliverdin, and gives the colour to the motion so characteristic of the disease. These green motions must be carefully distinguished from the chopped spinach motion of chronic entero-colitis, in which the colour is probably due to altered blood-colouring matter.

The pathology of the central nervous system in this complaint is of interest also, but I will touch upon one point only, and that is the depression of the anterior fontanelle, which is so often seen in the later stages of cases which are not improving. The explanation of this phenomenon which has been offered, is that it is due to withdrawal of the fluid elements from the brain by the flux from the bowels, so that an actual loss of bulk of the cranial contents ensues. As the bony case is not rigid in young children, atmospheric pressure from without leads to depression of the softest and least resistant parts, so that depression of the fontanelle and even overlapping of the bones ensues.

In prolonged cases, this collapse of the cranial vault may not be sufficient to compensate for the loss ; and a tidal wave of cerebro-spinal fluid being for similar reasons impossible or insufficient, the cerebral sinuses and large vessels become engorged with blood, the current becomes sluggish, owing partly to the engorgement, and partly to the enfeeblement of the heart's action, and so the conditions most favourable to thrombosis result. The superior longitudinal sinus is chiefly affected

in this way, and death results with difficult respiration, stupor, dilatation of pupils, and other nervous symptoms.

The diminution in the quantity of urine excreted depends apparently in part upon the quantity of fluid lost from the bowel; for although in cases of moderate severity this quantity is not very great, it is sufficient to cause a reduction of the blood pressure, and so to diminish the urinary secretion.

In cases where death occurs with uræmic symptoms, probably acute nephritis exists, the kidneys sharing in the inflammatory affection. Further investigations on this point would be of great value.

The morbid processes, concerned in the formation of the large masses of curd found in the intestines, deserve some attention. Doubtless, the use of milk, containing too large a proportion of caseine for the digestive power and age of the infant, has much to do with it. Certainly, too, irregularity in feeding must have its influence, since it gives rise to a catarrh of the mucous membrane of the stomach, with its consequent excess of mucus secreted, which in its turn favours acid fermentation, and also acts mechanically by preventing the access of the digestive materials to the food.

The increased acidity of the gastric secretion has another influence, in producing large masses of curd immediately upon the introduction of milk into the stomach, instead of the small flakes of curd which are formed in the healthy process. These masses are more liable to be formed if fresh milk be introduced to a stomach already in over-action, and containing a quantity of semi-digested milk, *i.e.*, time not being allowed for one meal to digest and pass into the duodenum, before another is given.

The masses of curd so formed are too large to be penetrated by the digestive ferments, and so they react mechanically as irritants of the intestinal mucous membrane. Microscopic examination shows them to be swarming with bacteria.

Treatment.

Treatment naturally divides itself into two headings—prophylactic and direct.

The study of the causes of gastro-enteric troubles gives the key to the prophylaxis, and by insistence upon proper care in feeding, where hand feeding is necessary, and upon an intelligent carying out of the directions in general hygiene, as well as in the choice of proper foods, more can be done in prevention than medicine can do in cure. The ignorance existing in these colonies amongst parents of even the better classes, about infant management, is simply appalling, but is transcended by the obstinacy, far worse than ignorance, of the large majority of so-called nurses to whose tender mercies we are committing the future men and women of Australia.

In the direct treatment, there are two points specially to be considered in regard to food—(1) The food itself, (2) The method of its administration. If the child be hand fed, milk being the chief aliment, to it must first be directed our attention in all cases of the disease which we are considering, and its possible faults and the harm they may do must be borne in mind. Our first aim must be to prevent or to cure the

formation of too large masses of curd, and to this end the exhibition of lime water or other alkalies, or the process of enzymising before administration should be resorted to in all cases.

The use of such preparations as nemcasei, which have for their object the approximation of cow's to mother's milk, may be sufficient. In a large number of cases, the condition of things before the patient comes under treatment is such, that success can only be obtained by boldly cutting off milk altogether for a time—if not at first, at any rate when attempts to render it more digestible have failed; barley water or rice water, and broth (carefully freed from fats), should be substituted, or one of the prepared foods, such as Mellor's or Allen and Hanbury's, made with barley water in place of milk, may be found suitable. As soon as the curds have disappeared from the motion, an attempt may be made to restore milk to the diet, the stools being carefully watched, and the milk cut off again if it passes undigested. A very convenient way of re-introducing milk, is to add it in increasing quantities to the barley water, given alone, or used in the preparation of artificial food.

I think I have given sufficient reasons for urging a greater attention to regularity in feeding infants, both as a preventive of disease and in the treatment of it. I need hardly allude to the quantity given except to say that, in all cases of gastro-enteric troubles, the quantity must be strictly curtailed from the first, according to the age of the patient.

Medicines.

I will not waste your time by repeating the usual routine of medicinal treatment. One or two points, however, are of interest. If the child has been hand fed on cow's milk in any combination, alkalies come first in the list of useful drugs. Their action consists chiefly in neutralising the natural acidity of cow's milk, and so approximating it more nearly to mother's, and rendering it more digestible. If there be much acid fermentation going on, the administration of alkalies after food must be of use.

Sedatives, notably opium, have probably been too little used hitherto. Their use has been almost limited to the induction of sleep, and for this they have been very properly condemned. There is very little doubt that small doses of opium, judiciously given to relieve pain, must save that nerve exhaustion, which tells more seriously upon an infant than upon an adult. The best form is pulv. ipecac. co. in doses of $\frac{1}{2}$–2 grains, according to age. In profuse watery diarrhœa, as an astringent combined with sulphuric acid, tincture of opium is very valuable.

Mercurials have been our stock remedy from time immemorial, and yet the therapeutics of the drug have been very imperfectly worked out. From clinical observation, the following would seem to be the indications:—

(1) That vomiting is often best controlled by small doses of the perchloride in solution, and this form has the advantage of being very easy of administration.

(2) That in diarrhœa of intestinal catarrh, small doses of $\frac{1}{2}$–$1\frac{1}{2}$ grains of grey powder, or $\frac{1}{10}$–$\frac{1}{6}$ grain of calomel, act well.

(3) That the benefit from their exhibition may not be fully seen until they have been pushed for one to three days.

(4) That during their administration, the stools first regain their normal colour, and then gradually diminish in frequency.

From these and other considerations, it would appear that the drug in question is a direct sedative to the mucous membrane of the alimentary canal, and especially to the stomach, and that it tends to control the acid fermentation which is so powerful a factor in the disease. This effect is twofold. Under the influence of mercury, the biliary secretion is increased—so experiment and clinical observation would lead us to believe—and bile being the natural intestinal antiseptic, this increase would tend to check acid fermentation ; also, as bile and pancreatic fluid too (arguing from the analogy of the salivary glands) are increased in quantity, this increase in quantity of the alkaline fluids poured out upon the already too acid material sent on to the intestines from the stomach, will tend to neutralise it, and so bring it more nearly to its natural condition. In addition to these results, the powerful antiseptic properties of the drug itself must be of great value.

Last of all, it appears certain, empirically, that mercury is a direct sedative to the mucous membrane of the stomach ; it probably continues a similar action upon the intestinal mucous membrane—an additional reason for its usefulness in catarrh.

In the treatment of the vomiting, creosote, especially in combination with small quantities of iodine, is of great value, sometimes checking the emesis where mercury has failed to do so. Its therapeutics closely resemble those of mercury in its antiseptic properties, and it has special value, which the mercury has not, in relieving the flatulence, which is a distressing symptom in the earlier stages. The sulphate of aniline is similarly of particular value in distension from flatus.

DISCUSSION ON GASTRO-ENTERITIS.

Dr. Walsh (Kew) recommended the administration of hydrarg. subchlor. gr. ij at the commencement of the attack ; he was not satisfied with his experience of antiseptics in this form of diarrhœa.

Dr. Dyring (Coburg) believed that there was a connection between typhoid fever and the epidemic gastro-enteritis of children, often seeing cases of both affections in the same family at the same time.

Dr. Davenport was dissatisfied with astringents in this form of septic diarrhœa. He had found chloral very useful in these cases, giving as much as gr. j every three hours to a child six months old. He considered that it acted as an antiseptic, sedative, and antipyretic. It was very beneficial to send patient away for a change of climate, as soon as the septic character of the stools cleared up. He also had been frequently struck by the apparent similarity between typhoid fever and gastro-enteritis in children.

Dr. Henry believed that dentition played a large part in the etiology of gastro-enteritis. He had found Brand's essence of chicken a useful substitute for milk in these cases.

Dr. Nickoll (Hawthorn) thought that as the reflex irritability of children was so great, the presence of the curds was a great factor in the etiology of gastro-enteritis, and so believed in the old-fashioned

castor oil. His Excellency the Governor had drawn attention to the very great infantile mortality in the colony; he thought it was due in great measure to the bad feeding and hot climate.

Dr. SALMON (Ballarat) had found great benefit from minute doses of calomel in cases of gastritis. Chloral was most useful in those cases depending on dentition as a cause. Ice by the mouth, and ice to the abdomen, he had found very useful in checking the symptoms.

Dr. COUPER JOHNSTON said that the etiology was very indefinite. He had found that improper food, sepsis, and arrest of secretions were three very potent causes. Arrest of perspiration often precedes an attack of gastro-enteritis, and the arrest of the same may often be procured by means of a hot bath, and wrapping the child in a blanket for ten minutes after the bath, giving six or eight drops of brandy if there is much depression. Regularity of feeding is not sufficiently insisted upon among the children of this colony.

Dr. POWER thought that bad drainage, was a powerful factor in the etiology of the disease.

Dr. JAMES ROBERTSON laid great stress on the diet being regulated, and rest in the recumbent posture. He also believed firmly in the use of castor oil at the commencement of the attack.

Dr. DAWSON said that the bowel was inflamed, and filled with irritating matter. The first indication was to clear away the irritating material: and second, to rest the bowel by suitable nourishment. He liked calomel better than oil, as it had a beneficial effect on the hepatic congestion.

In reply, Dr. SNOWBALL thought that the visitors had been too polite in not condemning the foul smells of Melbourne as a very potent cause of our high infantile mortality. He regretted that he was unable to share in the hopefulness about drugs which seemed to be entertained by most of the speakers.

Dr. COLLINGWOOD, in reply, laid great stress on the necessity for further investigating the pathology of gastro-enteritis in infants. He considered that milk was usually the vehicle for infection, and that the sudden changes of temperature were very detrimental to the milk. He did not consider the use of iced drinks rational in the treatment of children.

AN ANOMALOUS CASE OF ACQUIRED INFANTILE SYPHILIS.

By R. A. STIRLING, M.B. et Ch. B. Melb., L.R.C.P. et S. Ed.

In this case, the father, who acquired syphilis three years before marriage, after rigorous treatment was pronounced free of the disease. A relapse occurred some six months after his child was born, and infection of the child followed.

C. J., æt. 30, consulted me in 1882 with an infecting sore and a bubo. Under treatment with mercury and iodide, no secondary symptoms supervened. Not believing the true nature of the disease, he infected a

woman with chancre, and in her the secondary symptoms followed the usual course, lasting about a year, thus settling all doubt as to the genuineness of the attack.

In 1885, having been treated more or less continuously the whole time, and no sign—not even a blotch on the skin—appearing, he was allowed to marry, on the advice of another physician and myself. His son was born at full term, and was a healthy boy. Some weeks after birth, the child developed a rash about the anus, which caused the father much alarm ; but there were no snuffles. He slept well, was in good health, and all signs of eruption disappeared with the application of zinc ointment. The mother is now, and always has been, quite healthy.

When six months old, a small sore appeared on the lower lip of the child, followed by induration of a gland at the angle of the jaw. Simultaneously, there had been a breaking out of an old sore on the angle of the mouth of the parent, and it was undoubtedly the contagious secretion of this sore which had inoculated the infant. A macular syphilide, differing in no wise from the common form of the adult, next appeared on the front and sides of the chest, and a few moist papules on the anus and between the toes. The throat was not affected, and no other symptoms arose. The treatment consisted in inunction with blue mass, and internally the hyd. c̄ cretâ.

Such, shortly, is a sketch of an unusual occurrence—the child escaping infection during the latency of the disease in the father ; a latency brought about probably by early and prolonged treatment by hydrarg., and which goes to bear out the assumption of Zeissl and others, that in some cases mercury given at the early stage merely paralyses the activity of the syphilitic virus.

I should have before stated that the child was suckled by the mother until five months old, and then bottle-fed A nearly parallel case is infection of the mother by a hereditarily syphilitic child.

ON A CASE OF SYPHILITIC DACTYLITIS IN A CHILD.

By R. A. Stirling, M.B. et Ch. B. Melb., L.R.C.P. et S. Ed.

Dactylitis syphilitica is a rare affection, and as but few cases are on record, I have thought the following worthy of production, especially as I happened to be aware of the antecedents of one of the parents :—

Early in 1878 I circumcised, at the Melbourne Hospital, a young man who had an undoubted infecting sore on his prepuce, as well as a congenital phimosis ; the wound rapidly healed, no further symptoms of the disease became developed. and in three months from that time he married. (I may mention that in this, as in many other instances of syphilis, neither the inguinal nor any other glands were involved—the disease probably missing the lymphatics and entering the blood direct.) Two children were born of the marriage—a boy in April 1879, and a girl in August 1880. In 1885, the father consulted me for nodes

on the tibia, for which he had been some time under treatment by a Chinese doctor, and which he of course thought to have no connection with his former disease. These nodes, which were symmetrically placed, rapidly subsided under the tannate of mercury and potassium iodide. He looked robust and well, and with this exception had been free from any symptoms. In 1886, several gummatous ulcers appeared on the outer and inner sides of the legs, and required a renewed and prolonged course of medicine before healing.

He stated that all this time his wife was quite healthy, and had never had a miscarriage. In January 1887 he returned with his son, now nearly eight years old, who was suffering from an affection of the fingers. I found the terminal phalanges of the digits of the left hand, excepting the thumb, the seat of periostitis and ostitis—the swelling being situated more on the back than the front, and not involving the nails. Each finger was more or less swollen along its whole length, but this seemed to be due to œdema and to joint effusion, which much impeded movement. There was only slight redness and mottling at the ends of the fingers and at the back, and the pain was much less than in whitlows; although subsequently in the index finger there were all the symptoms of whitlow, with caries and loss of the bone—a true syphilitic onychia. The gummy deposit in the other fingers rapidly disappeared under treatment, and showed no tendency to break down. The fibrous sheaths of the tendons were not at all affected. Pressure over the ends of the fingers caused severe pain, but not at their bases.

The course of the disease was chronic, owing to the condition of the first finger, which at one time looked as if amputation would be required; but in the other fingers full doses of grey powder and the iodide of potassium, with occasional inunctions of mercurial oleate on the affected part, rapidly reduced the swelling, which had nearly all disappeared in six weeks. During treatment, however, the ring finger of the right hand showed signs at its initial joint of periosteal trouble, but the symptoms passed away.

One curious effect of the disease was to leave elongation and incurving of the nails.

This boy showed no other signs of late hereditary syphilis; and beyond a well-marked depression of the nasal bones, which was not present in the father, and several suspicious-looking striæ about the angles of the mouth, I could get no history of early infection.

Taylor, who has written fully on this disease, states that in its primary stage it is amenable to treatment; and to this circumstance of early treatment, and the peculiar features of the history, I think I owe its recognition, as the swelling is not unlikely to be put down as strumous, and treated with cod oil and tonics.

The points of interest are the immunity for many years of the father from syphilitic symptoms, after excision of the primary lesion—an immunity in my experience by no means unusual. The immunity of the son in infancy—no snuffles, nor wasting, eruption, or mouth-sores; no deformity of the teeth. The tertiary character of the disease in the father transmitted to the son, as shown in the former by the large size and small number (two) of the swellings, and in the latter by the disease itself.

ON A CASE OF ACQUIRED SYPHILIS IN A CHILD THREE YEARS OLD.

By JAMES P. RYAN, M.K.Q.C.P.I.

Chevalier of the Legion of Honour.

Surgeon to the Skin Department of the Melbourne Hospital.

Mrs. A. H., aged 25 years, first came under my notice as an out-patient at the Melbourne Hospital, on March 14, 1888. She was suffering from secondary syphilis, and had mucous patches about her lips, and on her tongue and pharynx, a dark coloured macular eruption slightly visible on the forehead, but well marked and widely distributed over the limbs and trunk, and condylomata about the vulva and anus. She was living with her husband, who was affected in a somewhat similar manner. She had been married for four years, and had one child, a girl, nearly 3 years old, and healthy, whom she brought with her when she visited the hospital. Her husband had an eruption on his skin about Christmas time, and a fortnight or three weeks later she also became affected. Previous to this, she had enjoyed good health. The child was always healthy, and had never suffered from a skin eruption. However, about the middle of May a pimple made its appearance on her forehead, above the left eyebrow. A week later it had become a slightly raised flattened patch, about the size of a three-penny piece, with a somewhat depressed centre, tending to scale. It became gradually larger, until a month from the time it was first noticed, it was as big as a shilling, nearly round, somewhat raised, with an indurated base, and the centre for a fourth of an inch was depressed and eroded. It was a good typical example of the "parchment" chancre, the peculiarities of which, according to Jonathan Hutchinson, are, "that its area of induration is large, and its thickness very small, whilst there is little or no inflammation." Two weeks later, a roseolar rash came out on her back, chest, abdomen, and thighs, a few spots showing on her forehead, her arms and legs being unaffected.

About the middle of August, absorption of the chancre had taken place, and there was left only a red patch to mark its site ; the eruption had assumed a coppery tint, the pharynx was deeply congested, and there were some small mucous patches on the tongue. Henceforward there was gradual but steady improvement, and when last seen by me on November 21, the rash had entirely disappeared, the mucous patches in the mouth nearly so, and there was only left a copper-coloured stain to mark the spot where the chancre once had been. The child's general health did not seem to suffer to any appreciable extent, and no treatment was employed until the eruption was fully out, when the daily inunction of mercurial ointment was begun, and continued until October 3, after which she was put upon small doses of hydrarg. c̄ cretâ.

There can be little doubt in this case as to the mode of infection. She was an only child, and the pet of both parents, who frequently fondled and kissed her. One of them, the mother, if not both of them, had syphilitic sores about the mouth, the child had probably some slight abrasion on her forehead, and through this the syphilitic poison made its entry.

Such a mode of infection is certainly uncommon, though why it should be so is not very clear, for undoubtedly a considerable number of women having young children, amongst the humbler classes in Melbourne, and amongst hospital patients, are the subjects of syphilitic disease.

THE CORRELATION OF FOLLICULAR TONSILLITIS IN CHILDREN, WITH OTHER ZYMOTIC DISEASES.

By A. HONMAN, M.R.C.S.

During the last four or five years, I have taken notes of a number of cases of follicular tonsillitis, which have come under my care. My attention has been arrested by the grave results which have frequently followed those suffering from this generally considered simple complaint. It must be observed that the vast majority of these cases have occurred amongst children and young people. The glandular activity prevailing during childhood, the well established functions of the tonsils, and their relationship to other glands consisting of lymphoid tissues, such as the solitary and agminated glands of the intestine; the numerous instances where the disease has assumed the character of an epidemic, the persistent way in which it returns to a neighbourhood where the surroundings are unhealthy, and the distinctive symptoms of its course, all lead me to believe that there is a distinct relationship between this disease and others of a septic character.

The symptoms in all the cases I have observed of this disease are as follow:—The attack is generally sudden, and may be preceded by a rigor, or in some cases, especially in younger children, by convulsions; in others, by wild delirium. Upon examination of the throat, there will be no sign of exudation, but the tonsils and uvula will be a deep cherry-red colour; the temperature ranges from 103° to 105°, or higher; the pulse is generally below 120. Twenty-four hours afterwards, the tonsils present a deeply congested condition, and are often so enlarged that they meet in the centre. The uvula is generally œdematous and congested.

In the earliest stage of the disease, the exudation from the crypts may be so great as to form one large pyramidal patch between the two pillars of the fauces. This patch is of a whitish colour, but possesses less tenacity than that of diphtheria, and has no inflammatory zone; and upon its removal, the orifices of the crypt will be found plugged with exudation, showing the typical appearance of follicular tonsillitis. The child may or may not complain of a sore throat, generally not; but this is generally due to the soft character of the food. The patient, if old enough, complains of headache, pains in the limbs and back. There is pain on pressure over the tonsils: these can be felt enlarged under the angle of the jaw, but there is no marked enlargement of the lymphatic glands, as in diphtheria. The skin is dry, the face flushed, and there is albuminuria in many of the cases. Within forty-eight hours, these symptoms gradually subside, if the case is going to be a favourable one.

If the patient is not exposed to any fresh infection, by being allowed out of doors, convalescence generally results by the fourth or fifth day.

These symptoms have been almost invariably the same in the 315 cases that I have observed, but some of them have been a cause of great anxiety to me, owing to the supervention of other diseases due to other septic causes, the chief one being that of diphtheria. In every case where this has occurred, I have always traced it to the patient being allowed out within the range of some particularly offensive gutters. Amongst others, I would mention two cases in particular :—

A child of 10 years of age, who had had one or two attacks of follicular tonsillitis, for which she had been under my care during the prevalence of an epidemic of this disease, became exposed to septic influence, and was laid up for two or three days suffering from the same. There were none of the symptoms of diphtheria ; the case progressed well, and all the exudations disappeared ; but before the tonsils resumed their normal condition, she was permitted to go out in the evening. Within a few hours a relapse occurred, but not being ill enough, as the parents thought, to send for me, she was brought to my surgery. I found well marked diphtheritic patches on her tonsils. Twenty-four hours after, the disease had attacked the larynx, and in spite of tracheotomy being performed, she died.

Just three doors from where this patient lived, I have been repeatedly called to a household, where every child is liable to attacks of follicular tonsillitis. The symptoms have all been the same as those described, and I never had any cause of anxiety with any of the cases ; but after the death of this child, the cases there appeared to get more and more obstinate (the gutters all the while becoming more objectionable), until at last, three months after the death of this neighbour's child, one of the patients in the house had an attack ushered in with violent convulsions ; patches appeared on the throat of a more tenacious character than usual, and finally, the symptoms became distinctly diphtheritic. Two months after this, another child in the same house was affected with diphtheria ; both these cases recovered. I may mention at the time, in connection with this, that I removed the tonsils of a child in this last house, and she was foolishly permitted to go to Sunday School the same afternoon. The malignant character of our drainage system in Williamstown may be guessed, when I state that this short walk, where she was exposed to the exhalations arising from the gutters, resulted in the raw surface of the tonsils being covered with a copious exudation within thirty-six hours, with all the symptoms of follicular tonsillitis.

There is a fatal case of diphtheria quoted in the *Lancet*, where tracheotomy was performed. On post-mortem examination, ulceration of Peyer's patches was found. The case had an unusually high temperature.

A similar case, where a youth aged 14 was attacked by follicular tonsillitis, and where the patches disappeared within forty-eight hours, his temperature gradually becoming normal, against my directions took a walk before convalescence was established. On the next day, his temperature was 105°. In a day or two, the case assumed a typhoid character, and on the eighteenth day, he died from perforation of the bowels, having suffered for three days previous to his death from uncontrollable hæmorrhage from the bowels.

With respect to the association of follicular tonsillitis with scarlatina, I may mention that in no cases have I seen any peeling of the skin after an ordinary attack of the former, but I have seen the two diseases attack different persons in the same household :—A young man, who had suffered from repeated attacks of follicular tonsillitis, was once more laid up with an attack of this disease. He recovered without any other symptoms, and there was no peeling of the skin. His illness lasted four days. His sister, married, was also attacked, but in a mild form. Her two children, aged 8 and 6 years respectively, two days after the first case was attacked, showed symptoms of scarlet fever, which after a long and severe illness, terminated in peeling, and in one case in nephritis. This child recovered.

These cases I have mentioned, in order to show the association of follicular tonsillitis with other diseases of septic origin. The frequency with which I have observed a series of cases, where there has been no intercourse between the families attacked, led me to believe that there must be some other cause for this illness than an ordinary chill, and I believe that that cause is no other than the defective system of drainage that prevails in Williamstown. I believe that follicular tonsillitis is common elsewhere; but the flat nature of the ground on which the town is built, and the consequent stagnation of the sewage in the open drains, seem to me to account for the large number of cases prevailing in this town.

I need not give a detailed account of our sanitary defects, because they prevail alike in Melbourne and the other suburbs, but I should like to point out what the condition of things must be in a town, where the majority of the liquid manure finds its way into the open gutters; where the water supply is cut off for half the year for the whole of the working day; where twice a week the green decomposing material fermenting in the gutter is removed by the town scavenger, and placed in the centre of the road, to be dried up by the first hot wind, and distributed in generous proportions to the unfortunate inhabitants of our town. When added to these conditions, in the older parts of the town, we have numerous sweltering lagoons of filth, caused by the building of houses on land sold by syndicates during the late boom, without the slightest attention being paid to the disposal of the drainage from the houses, is it any wonder I ask, that sore throats prevail of such malignant nature. In several districts of Williamstown, this disease has assumed quite an epidemic character, and I have noticed this more particularly after a shower or two, when the ground has commenced to dry; but during the last hot weather, cases have been almost as numerous. In two districts of the town, when the gutters have been unusually foul, nearly every house had a case of follicular tonsillitis, and in some cases there were two or three in one house. More particularly I would mention one street leading down to the bay, where there is a row of houses having most offensive drains both at the back of the houses and at the front. In one house, five cases of this disease occurred—the first being a child of 3 or 4 years of age, his two sisters then became affected, and finally the parents of the children. At the back of their house I had another case, which followed the usual course. Their cousins who lived in the same house and who had been away for a change, on returning, were all laid up with the same

complaint. All these cases recovered very quickly. In another house, I have seen every child in the house attacked most severely with follicular tonsillitis. In the same house, there are now four severe cases of typhoid fever, three of them having also suffered from follicular tonsillitis. In another house in the same locality, where a female was laid up, she was visited by a young girl who lived at some little distance where there were no cases at the time; within a day or two, she also had an attack, but much milder in character. I could go on for some time giving instances of its infectious character.

The treatment I adopt in these cases, has always been to reduce the temperature as speedily as possible, in order to avoid complications, such as pneumonia, &c.—not an unnecessary precaution I have found, when I have neglected to do so. I have found that I could in most cases accomplish this by means of salicylate of soda, together with an ordinary saline mixture; but lately I have found that in Phenacetin-Bayer, one of the latest synthetical compounds introduced in antipyretics, I had a most reliable remedy for this purpose. In a few hours pain is relieved, and the temperature becomes nearly normal. Indeed, in all cases in children, as well as in adults, where a high temperature prevails, I have been astonished at its antipyretic virtue and its sedative effect, and I now invariably use it in preference to antipyrin or antifebrin, as I find it is less depressing, and there is not the same tedious convalescence after its prolonged use, as there is after the former named drugs.

I feel that this paper is deficient in many things that should make it complete; for instance, the microscopical character of the exudation, and a complete series of temperatures, &c., but the little leisure permitted by a general practice has not allowed me to render it more complete. My object in writing is to draw attention to a simple disease very evident to the eyes, which I believe is solely due to our bad gutters and system of drainage, and to endeavour to draw some analogy between the causes of this disease and of typhoid fever and diphtheria, with a view of showing the means of preventing epidemics of such diseases by a complete and scientific system of drainage.

PATHOLOGICAL MUSEUM.

CATALOGUE OF SPECIMENS

Submitted by H. B. ALLEN, M.D.

Professor of Anatomy and Pathology in the University of Melbourne.

1. Arterio-venous popliteal aneurism, following a strain of the knee which fractured the patella. (See *Australian Medical Journal*, September 1878.)
2. Aneurism of sinus of Valsalva of aorta, almost filled with laminated clot.
3. Aneurism of aortic arch opening into the pulmonary artery, and subsequently bursting into the trachea.
4. Dissecting aneurism of thoracic aorta, starting in a patch of atheroma in the third part of the arch, and extending upwards to the pericardial reflexion, and downwards to the diaphragm.
5. Pyriform aneurism, arising from the junction of the ascending and transverse portions of the aortic arch, completely occluded by laminated fibrin by unassisted natural processes.
6. Huge aneurism of aortic arch, rising into the neck in front of the right carotid sheath, distorting the origin of the innominate artery, and simulating innominate aneurism.
7. Aneurism of upper aspect of transverse portion of aortic arch, with enormous deposit of pale clot, occluding the orifices of the great arteries. Consciousness was retained twenty-four hours before death.
8. Pulmonary stenosis, with patent foramen ovale. The segments of the pulmonary valve are fused together. The orifice is reduced to a small chink. The foramen ovale is patent, almost circular, an inch in diameter. The patient, a married woman aged 29, died greatly emaciated, with pulmonary tuberculosis and bronchi-ectatic cavities. There was no dropsy.
9. Malformation of pulmonary valves. The valve consists of a single annular segment, thick and opaque, with narrow orifice and beaded edge. There is one sinus of Valsalva, anteriorly and to the right. The valve is bound down to the arterial wall posteriorly. The pulmonary artery is very narrow. The right ventricle hypertrophied, but not notably dilated. The patient was more or less cyanotic from birth. She died at the age of 27, with extensive caseous peri-bronchitis. There was no dropsy. A loud bruit was heard over the sternum, especially opposite the second interchondral space.
10. Aorta and pulmonary artery combined, arising by one trunk from two ventricles.

11 and 12. Tricuspid vegetations. No other valves affected. Two specimens.

13. Recent mitral and aortic endocarditis from a case of typhoid fever.
14. Aneurism of trunk of pulmonary artery.
15. Sudden extensive rupture of inner coats of a flabby friable aorta, apart from advanced atheroma.
16. Embolisms of cerebral arteries with consecutive arteritis and aneurisms.
17. Cirrhosis of lung.
18. Fibro-pigmentary consolidation of lung with basal cavity, from a miner aged 55.
19. Acute typhlitis, the walls of the cæcum being greatly swollen, soft, pale, but not yet absolutely sloughing.
20. Acute dysentery, with sloughing false membranes.
21. Colitis and proctitis, with large pale oval ulcers having thin undermined edges.
22. Chronic dysentery, with thickening of the muscular coat, and irregular ulceration and granularity of the mucous membrane.
23. Chronic dysentery, with atrophy of the coats of the intestine, and ragged pale ulcers of the mucous membrane.
24. Chronic dysentery, with papillose ulceration of the mucous membrane.
25. Syphilitic rectum from a woman. Immense thickening of the coats; extensive cicatricial stricture just above anus; irregular pitting of the intestine above the stricture; and chronic serpiginous ulceration for several inches higher up.

26 and 27. Two cases of multiple intussusception of the small intestine obtained from children who died respectively of diphtheria and of obstinate vomiting after lithotomy. In both, intussusception occurred in the death process. In one case there were ten, in the other eleven, distinct intussusceptions. In the great majority of instances, the invagination was downwards, but in some it was upwards; and occasionally a downward and an upward invagination occurred in close proximity, so that the two incarcerated parts came almost into immediate relation.

28 and 29. Two specimens illustrating fatal intussusception; one is a case of slow intussusception at the ilio-cæcal valve; the other is a case of rapid intussusception in the ileum, the invaginated portion being thickened by inflammation and hæmorrhage, and rapidly sloughing.

30. Cystic kidneys, weighing together 68 ounces. The patient died of tubercular epididymis and general tuberculosis consequent upon it.
31. Renal calculi (*Australian Medical Journal*, November 1883).
32. Tubercular ulcers in ureters.
33. Tubercular epididymis.

34–38. Series of complicated hydroceles—

(*a*) Encysted hydrocele in the usual position, with an opening below into the tunica vaginalis.

(*b*) Hydrocele of the tunica vaginalis, covering the front of the testis, and overlapping in its upper part an encysted hydrocele—(two specimens).

(*c*) Encysted hydrocele, with hæmatocele of the spermatic cord.

(*d*) Hydrocele of tunica vaginalis of a partly descended testis. The testis had remained a short distance below the external abdominal ring. The sac of the tunica vaginalis had closed at the internal ring; but, by the accumulation of fluid within it, had bulged up through the internal ring, so as to form an external and an internal cyst communicating by a narrow constricted neck through the internal ring.

39. Necrosis of shaft of tibia, showing a large irregular central sequestrum, and also a large regular sequestrum, which involves almost the whole thickness of the shaft, but is retained by the capsule of new bone formed by the periosteum.

40. Abscess in the head of the tibia, with long curved sinus, opening about four and a half inches down the shaft of the bone. Indurative ostitis around the abscess and the sinus. (See *Australian Medical Journal*, June 1885.)

41. Degenerative changes in the lower end of the tibia and in the tarsal bones, in a case of anchylosis of the knee, with long standing ostitis of the upper part of the tibia. The bones are thin shells filled with soft yellow fatty tissue.

42. Old fibrous anchylosis of the knee, a vertical median antero-posterior section showing the epiphysial cartilage. The articular cartilages are intact, except at a few points where adhesions have occurred. The spaces of the joint are filled with fatty tissue, developed in the synovial folds.

43. Advanced morbus coxæ from a child with necrosis of the acetabular floor. (*Australian Medical Journal*, November 1879).

44. Intense morbus coxæ, originating in synovitis, the cartilage of the head of the femur separating in large flakes.

45. Caries of the trochanter major of the femur, without joint disease.

46. Suppuration of the bursa between the great trochanter and the gluteus maximus. A granulating surface covers the part of the trochanter involved.

47. Incipient necrosis of the outer surface of the trochanter major, secondary to suppuration of the gluteal bursa.

48. Chronic arthritis deformans of hip, showing the eburnated articular surfaces, the elongation, flattening and lowering of the head of the femur, and the corresponding changes in the section of the femur, partly indurative, partly rarefying.

49. Senile changes in the upper end of the femur. Erosion of articular cartilage. Formation of a marrow cavity in the neck, with delicate trabeculæ in the wall of the cavity.

50. Symmetrical double dislocation of the knees. The heads of both tibiæ have been completely displaced behind the lower ends of the ossa femoris, and false anchylosis has occurred in this position. Nearly all the joints were affected. The sequence of events was pain, effusion, distortion, absorption, anchylosis. (*Australian Medical Journal*, January 1880.)

51. Caries sicca of spine, the body of one of the lumbar vertebræ having crumbled away without suppuration. The symptoms resembled those of aneurismal erosion. No evidence of tubercle or syphilis. (*Australian Medical Journal*, June 1879.)

52. Acute caries, with suppuration of two cervical bodies, and destruction of the fibro-cartilaginous disc between them.
53. Caries of spine, with double psoas abscess. The first and second lumbar vertebræ are affected. The destruction of bone is much greater on the left side than on the right, so that the lateral angular curvature is marked, while there is scarcely any boss posteriorly (*Australian Medical Journal*, July 1879).
54. Bullet embedded in body of a lumbar vertebræ, with no perceptible injury of the surrounding bone.
55. Pulpy swelling of the synovial membrane of the wrist, with destruction of the joint. The changes in the cartilages are largely proportionate to the degree in which they come into direct contact with the inflamed synovial membrane.
56. Spondylolisthesis.
57. Comminuted fracture of shaft of humerus, with formation of a false joint.
58. Patella fractured transversely, and united by bony union, without any external callus.
59. Chronic inflammation of bursa patellæ. The sac has thickened indurated walls and contains many melon seed bodies, partly free, partly attached to the parietes.
60. Chronic inflammation of bursa patellæ, with formation of a solid fibroid tumour-like growth.
61. Hydatidiform mole.
62. Interstitial hæmorrhage into uterine wall, opposite the placental attachment at the fundus. Rupture of peritoneum and fatal hæmorrhage into peritoneal cavity.
63–64. Hydrosalpynx. In both cases, there is decided stricture at the ostium internum ; and at the outer end, the tubes are firmly bound to the ovaries by old adhesions.
65–69. Monsters—
(*a*) Ectopia cordis, with double hare-lip.
(*b*) Occipital encephalocele.
(*c*) Blighted fœtus, without head, neck, or upper limbs.
(*d*) Anencephalous fœtus.
(*e*) Ectopia of liver and intestines, with malformation of spine and lower extremities, and no external genitals.
70–80. Syphilitic, tubercular, and cancerous larynges.
81. Huge goitre, removed by Mr. FitzGerald, hypertrophic, solid ; the section presenting a reticular structure consisting of enlarged alveoli, with firm membranous walls, containing grey firm colloid matter.
82. Unilateral hæmorrhagic goitre, consisting of a dense-walled sac, full of firm partly decolorised clotted blood.
83. Small cystic goitre, with calcification of the walls between the cysts.
84. Huge unilateral cystic goitre, with lowly organised solid growths sprouting from the interior.
85. Perithyroid growths of various character.
86–88. Syphilitic testes—
(*a*) and (*b*) from the same patient. (*a*) Enlarged, somewhat uneven on the surface, densely fibroid, of stony hardness,

the testis and epididymis fused together, but no gummata present; (*b*) still larger, also hard, but less so than (*a*), smooth on the surface, and containing distinct opaque dry yellow gummata, embedded in fibroid tissue.

(*c*) showing small gummata lying in dense fibroid tissue. The surface is irregular and knobbed, with severe chronic inflammation of the tunica vaginalis.

89–90. Syphilitic lesions of liver—

(*a*) huge gummata, dry and firm.

(*b*) irregular cicatrices.

91. Syphiloma of tongue, superficially simulating epithelioma, but deeply presenting a sharply defined oval infiltration, only partly masking the normal structure.

92. Syphilomata of frontal lobe of brain, with central softening.

93. Syphilomata of dura mater, showing diffuse fleshy thickening, with low lobulated growths on the cerebral surface.

94. Syphilomata of pia mater, forming along the arteries at the base of the brain (*Australian Medical Journal*, April 1882).

95. Firm fibromata in both ovaries.

96. Soft pedunculated fibroma of labium majus, with superficial excoriation.

97. Huge uterine myoma, with a moderate degree of cystic degeneration. One quarter of the tumour is shown as a wet specimen; one half of the tumour is shown dried, being shrivelled to extremely small dimensions and extremely heavy. Query—Are the modifications of the size of uterine fibroids under treatment, or in relation to the catamenia, dependent on the varying amount of fluid infiltrating their substance?

98. Pedunculated myoma hanging from the cervix uteri, and filling the upper part of the vagina.

99. Fasciculated myoma of abdominal wall. This tumour grew in the skin of the abdomen of a Chinaman, and, having attained a diameter of nearly four inches, is enucleating itself. The skin is adherent, thinned, and at parts perforated, the firm rounded dry lowly lobulated growth being completely exposed in the perforated parts. As Sir J. Paget says, such enucleation is a natural tendency of myomata, and not dependent on the contraction of the muscular tissue in which they arise. (*Australian Medical Journal*, October 1880).

100. Compound cauliflower condyloma of labium majus.

101. Sarcoma of left testis spreading up the spermatic veins, infiltrating the left kidney, extending along the left renal vein into the vena cava, and presenting into the right auricle. Fungating sarcomata of lungs and sarcomata of liver.

102. Primary sarcoma of lung, forming a huge homogeneous firm grey growth, composed of small spindle cells.

103. Lympho-sarcoma of mediastinum overlapping the heart (*Australian Medical Journal*, October 1880).

104. Melanotic sarcoma of lungs, liver, heart, breast, lymphatic glands along the pancreas, &c. (*Australian Medical Journal*, November 1880.)

105. Sarcoma of periosteum of bodies of dorsal vertebræ, spreading through the intervertebral foramina, and extending along the dura mater.
106. Sarcoma of kidney of a child, containing striped muscular fibres. (*Australian Medical Journal*, March and April 1886.)
107. Central sarcoma of both humeri, just below the surgical necks.
108. Discoid carcinomata of the mesentery along the line of intestinal attachment, spreading into the intestinal wall. Carcinoma of the semilunar ganglion. (*Australian Medical Journal*, May 1883.)
109. Simple cyst of liver, five inches in diameter, containing simple serum. (*Australian Medical Journal*, May 1883.)
110. Small cystic growths from lining membrane of both ureters.
111. Congenital sacral cyst of large size, formed by a terminal spina bifida.
112. Multilocular ovarian cyst, with papillomatous growths from the external surface.
113. Multilocular ovarian cyst, with much solid growth at the base. These growths consist of laminated deposits of epithelium and cholestearin, encapsuled in fibrous tissue, and vary in size up to more than an inch in diameter. (*Australian Medical Journal*, July 1880.)
114. Dermoid ovarian cyst, with growth of bone, teeth, and hair. (*Australian Medical Journal*, August 1882.)
115. Dermoid ovarian cyst, with large growth of hair, and with large steatomatous deposit.
116. Cholesteatoma growing from peritoneum at the fundus uteri. (*Australian Medical Journal*, November 1879.)
117. Cystic kidneys, weighing sixty-nine and forty-one ounces, from a man aged 43, who died of uræmia.
118. Seven flukes (distoma hepaticum) removed from the bile ducts of a man. There was a large foul abscess of the liver, and dilatation and suppuration of the bile ducts within the liver.

Note.—In two other cases, Professor Allen has found a single fluke in the bile ducts of human beings.

Specimens of Hydatid Disease.

1. Hydatid of liver, showing a thin shining perfectly organised adventitia, resembling a fibro-serous membrane.
2. Hydatids embedded in right lobe of liver, with perfectly organised adventitia. A second cyst growing from the lobulus Spigelii is thin-walled and movable, and is inserting itself between the layers of the small omentum.
3. Hydatids of liver, several specimens, with thick opaque irregular adventitia, imperfectly organised. Query—Does the character of the adventitia depend on the rate of development, or on the situation in which the growth starts—a thin, smooth-walled sac being formed when the embryo lodges within a portal capillary, and a less highly organised sac being produced when the embryo developes among the hepatic cells?
4. Hydatid of the liver adherent to the diaphragm, and having a very tough secondary adventitia, nearly an inch thick, developed between it and the diaphragm.

5. Multiple hydatids of liver. One large cyst in the right lobe was suppurating. Others were stuffed full of collapsed cysts and concreted biliary matter. Others were mature, containing limpid fluid. The patient died of dislocation of the spine, caused by a fall.

Note.—A very narrow septum may divide a suppurating hydatid from one showing no signs of degeneration or inflammation.

6. Multiple hydatids of liver. One very large thin-walled cyst has developed at the extreme right of the liver, and is bounded in the greater part of its extent only by the thickened serous coat. Another grew from the back of the left lobe, and bulges into the fissure of the vena cava. A third, lying a little further forward on the under surface of the left lobe, is separated from the foregoing only by the thin fused adventitiæ. A fourth is buried in the left lobe, at its upper aspect. A fifth is embedded in the left lobe, and abuts on the serous capsule at its anterior border. A sixth is thoroughly predunculated, and is attached to the anterior border of the left lobe, just where the serous coat forms part of the adventitia of the fifth. The first cyst was much the largest, and evidently at one time was embedded in the right lobe, abutting on the serous coat only to a limited extent. But its subsequent increase in size caused it to be bounded by the serous coat over the greater part of its surface. There is a limited patch of thickening in the part of the adventitia now formed by the serous coat, sharply defined and circular, indicating the original connection of the cyst with the serous capsule.

7. A hydatid of the liver five inches in diameter, with thin well-organised adventitia, but containing, instead of a single mother-cyst and its progeny, a mass of small cysts loosely adherent together in an oval mass.

8. Part of the adventitia of an old-standing hydatid, with flakes of gelatinous membrane adherent to it. The adventitia is uneven, and altered by inflammation into an imperfect granulation tissue, partly organised.

Note.—Such true adhesion of the mother-cyst to the adventitia is very rare, and is seen only in old-standing cysts. The adhesion is an abnormal occurrence in the life of the hydatid, and probably never occurs apart from degeneration and inflammation.

9. Hydatid of the liver opening into the hepatic duct.

10. Hydatid of the liver perforating the diaphragm, and forming a cavity in the base of the lung, bounded by indurated lung substance, and opening into a bronchial tube.

11. Hydatid of the liver, treated by tapping and insertion of a drainage tube between the ribs. This specimen shows how the contraction of the cyst interferes with drainage so conducted.

12. A series of specimens of old-standing hydatids of the liver, showing changes in the adventitia, partly thickening, contraction and puckering, partly calcification. In some, the earthy matter is uniformly diffused, forming a complete calcareous shell ; in others, it is deposited in irregular nodules.

13. A series of specimens, showing retrogressive changes in the contents of hydatid sacs:—Collapse of the cysts, accumulation of fatty smegma, deposit of biliary matter, which in some cases forms large concretions.
14. Primary carcinoma in the thick adventitia of a retrogressing hydatid of the liver.
15. Secondary carcinoma in the adventitia of a hydatid of the liver. The primary scirrhus grew in the pancreas. The adventitia of the hydatid was formed in part by the thickened serous capsule; and in this part of the adventitia, plates of scirrhous carcinoma have developed.

Note.—Professor Allen has seen a case of primary carcinoma of the liver, forming a huge mass in the left lobe, with smaller tumours scattered through the liver; a hydatid as large as the mature fœtal head lay in the centre of the liver, and was not involved in the cancerous growth. In another case there was a carcinomatous growth, 3½ inches in diameter in the liver, abutting on the anterior border; while two large hydatids were present in the posterior part of the liver, one of them being separated from the cancer by only half an inch of liver tissue.

16. Small hydatid in the muscular wall of the left ventricle, bulging under the pericardium.
17. Hydatid of spleen of huge size, forming an ovoid sac, with tough thin adventitia, representing little more than the thickened capsule. The inner surface of the adventitia is opaque, yellow, and uneven.
18. Hydatid of the spleen, with very irregular adventitia, formed partly by altered splenic substance projecting in great lumps into the cavity, and partly of the indurated greatly thickened capsule.
19. Huge hydatid of spleen, showing the mature mother-cyst, and the comparatively smooth adventitia, which is formed chiefly from the serous coat.

Note.—Other hydatids of the spleen are on the shelves, but in none is there that perfect organisation of the adventitia which is seen in many liver hydatids. Cysts of the spleen do not readily collapse after tapping, and special care is necessary in their drainage. In one case, however, in a man who was brought to the Melbourne Hospital in a dying state, the autopsy revealed several small hydatids in the spleen, with calcified adventitiæ, easily shelled out of the tissues around.

20. Multiple hydatids of the omentum.
21. Hydatid of the omentum, bounded by firm adventitia, and containing collapsed degenerating cysts closely crowded together.
22. Hydatid, with very thick adventitia, attached to the omentum. Removed by Mr. FitzGerald by abdominal section.

Note.—These movable omental hydatids are eminently adapted for removal by abdominal section. Tapping seems to be attended with special danger.

23.—Hydatid of pelvis. A cyst about four inches in diameter, containing clear fluid and scolices, which was found lying destitute of adventitia in the vesico-uterine pouch. It was adherent to the peritoneum only by a small tag of gelatinous membrane (*Australian Medical Journal*, April 1882).

24. Spherical hydatid, $4\frac{1}{4}$ inches in diameter, attached to fundus of uterus and bladder, and opening into the right Fallopian tube, which is dilated and full of cysts (*Australian Medical Journal*, October 1879).

25. Hydatid in the substance of the diaphragm. One large and several small gelatinous cysts are packed together within one adventitious sac.

26. Mature hydatid of kidney, about four inches in diameter, projecting boldly under the capsule.

Note.—Dr. C. Smith, of Casterton, exhibited hydatid cysts of the kidney, which passed down the ureter and escaped by the urethra.

27. Multiple hydatids of liver, with complicated masses of hydatid cysts growing in the pelvis, adherent to all the structures around.

28. Hydatid of the right ovary, of large size.

Note.—This is the only case of ovarian echinococcus which has come under Professor Allen's observation. Specimens 26, 27, and 28 were obtained from the same case.

29. Hydatid encapsuled among coils of intestine, and opening into the jejunum. The patient had obscure flabby swelling of the abdomen, with chronic dyspeptic symptoms. The orifice between the cyst and the bowel was well defined, and of long standing. The sac contained a foul mixture of bilious intestinal matters, and decaying gelatinous membranes.

30. Hydatid growing from under surface of the anterior part of the liver, in the midline of the body, which closely resembled aneurism of the cœliac axis. The bruit, pulsation, and thrill were strongly marked; but the lateral pulsation was not distinct, and the aneurismal signs were greatly diminished in the knee-elbow position.

31. Retrogressing hydatid between the liver and diaphragm.

Note.—Several other instances of hydatid in this situation are recorded in the pathological registers of the Melbourne Hospital.

32. Hydatid of limited size, with firm adventitia growing from the front of the sacrum, extending through the anterior sacral foramina, and up the spinal canal as far as the last lumbar vertebra. The hydatid within the spinal canal was bounded only by the mother-cyst. It contained great numbers of daughter-cysts. There was partial paraplegia. Finally, the cyst ruptured into the subdural space, and there was rapid ascending paralysis. (See *Australian Medical Journal*, May 1879.)

33. Calvarium from a girl who had intracranial hydatid. The skull cap is expanded, greatly thinned, with numerous perforations, closed only by membrane.

34. Hydatid cyst growing from the superior surface of the right orbital plate of the frontal bone.

35. Large hydatid in the left frontal lobe of the cerebrum, presenting at the orbital surface. Specimens 34 and 35 were removed from a girl aged 13, who died after six months' illness. At first, she suffered only from epileptic fits; but two months before death, she lost power in the left leg, and gradually became unable to stand; then unable to turn herself in bed. Finally, she became unconscious, and died in convulsions.

36. Hydatid of cerebrum in the right mid-convexity, occupying the marginal convolution and the lower part of the ascending parietal. Bulging slightly beneath the arachnoid, and abutting deeply on the body of the lateral ventricle. There is only a very slight induration of the brain tissue around. (See Cobbold on "Parasites," 1879, pp. 140–141.)
37. Huge hydatid following out of the upper part of the left cerebral hemisphere, from the front of the occipital lobe forward into the back of the frontal lobe.
38. Hydatid cyst in left occipital lobe of cerebrum, presenting at the extreme posterior end of the hemisphere.

Notes of Cases of Hydatids from the Pathological Records of the Melbourne Hospital, added by Professor Allen.

1. A case of hydatid behind the peritoneum and in front of the right psoas muscle, extending from the diaphragm under Poupart's ligament into the thigh. The patient died of aneurism of the aortic arch.
2. Large hydatid growing in and distending the gall-bladder. The liver was cirrhosed. There was jaundice, with epistaxis and intestinal hæmorrhage.
3. Huge cyst of right lobe of liver opening into the ascending colon.
4. Right lobe of liver completely occupied by a cyst which opened freely into the cystic duct. There was slight jaundice.
5. Large cyst in centre of liver. A hepatic duct admitting a large catheter opened into it. General jaundice. Contents of cyst deeply bile-stained, but not purulent.
6. Two large hydatids in the same liver, separated only by the fused adventitiæ—one suppurating, the other infiltrated with bile, but not suppurating.
7. Cyst between liver and spleen passing through the spleen to become adherent to the diaphragm.
8. Right lobe of liver completely occupied by a cyst. A branch of the hepatic artery close to the transverse fissure opened into the cyst, which was filled with partly decolorised clot. Death was due to primary tuberculosis of the trachea with secondary acute pulmonary tuberculosis.
9. Cyst occupying the lower half of the abdominal cavity; bounded in front by the abdominal wall, and elsewhere by coherent coils of slate-coloured intestine and mesentery. Full of clear limpid fluid. No daughter-cysts. In the left iliac region, there was a thick layer of honey-combed lymph, outside the mother-cyst, adherent to the adventitia. This cyst occurred in the same patient as the foregoing.

Notes of eighteen cases of hydatid disease within the chest, reported by Professor Allen, will be found in the *Australian Medical Journal* for March and May 1881. The specimens from several of these cases were shown at the Congress.

APPENDIX.

ANTISEPTIC SURGERY AND SOME OF ITS RESULTS.

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Antiseptic surgery, though occupying a somewhat different field to aseptic surgery, has almost identical aims. By the one method we preserve a wound perfectly pure ; by the other we render it so, when, as in an accidental wound, it has been previously contaminated. To those who, like myself, have watched its progress, and endeavoured to carry its principles into every day practice, it is a matter fraught with very great issues, and deserving of the most serious consideration. Like many great discoveries in our profession, it has been subjected to an immense amount of criticism, and an unlimited amount of abuse. It has had innumerable imitators, who, in many extraordinary ways, have tried to establish systems of their own, and who in many instances would have us believe that antiseptic surgery is possible with "antiseptics left out." Hence the phrase, that every careful surgeon is an antiseptic surgeon, whatever means he may employ. Listerism presents, to those who believe in it, a creed of no ordinary kind. There is no room in it for any vacillation, hesitancy, and doubt. It compels obedience to a certain line of action, from which there can be no deviation. Details may vary, but the principles remain fixed and immutable. Mr. Savory, in his celebrated address "On the Prevention of Blood-poisoning in Surgical Practice,"* says, speaking of Listerism, "But the principle on which it rests is a sound one, the logical outcome of established facts." What those principles are, their application to wound treatment will show. What they should enable us to accomplish, may be inferred from the following statement by a recent authority on the subject. He states :—"It cannot now be denied that the surgeon's acts determine the fate of a fresh wound, and that its infection and suppuration are due to his technical faults of omission and commission." This is undoubtedly true ; and it is a matter for sincere congratulation that, thanks to Listerism, we have reached something like exactness in surgical therapeutics. And is it not a matter of daily experience, that just in proportion as our antiseptic plans are carefully and judiciously carried out, so will our results be favourable or otherwise? The marvellous and rapid strides which operative surgery has made within the last few years, have been largely due to the safety which antiseptic measures confer.

Operations are now undertaken with comparative unconcern, which were formerly a dread to the surgeon, and always a peril to the patient. Regions have been invaded which were thought to be sacred from the surgeon's knife, and wounds of the limbs are now recovered from, which

* *Medical Times and Gazette*, August 1879.

in pre-antiseptic days would have imperatively demanded amputation. Hospitals, which before were almost untenable, hot-beds of blood-poisoning, and on the point of being pulled down, have not only been rendered habitable by antiseptic means, but some of the most brilliant successes on record achieved within their walls. It has passed far beyond the limits of general surgery, and not to particularise other fields, in obstetric practice, most brilliant and lasting results have been attained. In this direction alone, had it had no other *raison d'être*, the immunity from disease, and the saving of life, which it is daily effecting, would entitle it to the gratitude of mankind, and give it an imperishable fame. The "germ theory," on which Listerism is based, has had considerable influence in retarding its acceptance by many who are otherwise inclined to view it favourably. This is not to be wondered at, when we hear surgeons of eminence speak of so-called germs, and sneer at their power of doing any harm whatever. Fortunately, however, bacteriology is now so firmly established, and its conclusions so clearly worked out, that no one can deny on scientific, or any other grounds, the important part that they play in diseased processes most intimately connected with surgery. It now supplies the proofs in abundance, which were in a measure defective in the early investigations of Schwann, Pasteur, and Lister. On what a solid foundation the relation of micro-organisms to surgery rests, will be apparent when we consider the means which have been adopted to prove the connection. "No micro-organism is regarded as the cause of a disease, unless it is, in the first place, found to be constantly present in that disease, either in the blood or in the tissues; secondly—unless, when carefully isolated and cultivated, it can, when introduced into the body of a healthy animal, give rise to the original disease, and be again found in quantity in the body." *

If we bear in mind that even the "oil of turpentine injected under the skin will not produce suppuration without the presence of a germ; and if some cultivated pus-producing micrococcus be rubbed on the intact and healthy skin, it will occasion inflammation and a wide-spread crop of boils," † the bearing of germ life on surgical processes is further exemplified. Wound infection, and the various forms of blood-poisoning which in many cases follow, are undoubtedly due to specific micro-organisms. Whence do they come? Omitting for the present the more obvious sources, such as the surgeon's hands, instruments, sponges, and the various appliances of an operation, the question may be asked—How far is the air responsible for them? To those who use the spray, this is a matter of much importance. Let us see what the air is capable of doing; and first of all, I deny that there is surgically pure air, any more than there is surgically pure water.

The micro-organisms of the air are capable of setting up decomposition in every fluid and solid that possesses the elements of decomposition. "Some require an animal diet, others a vegetable one, and for some a specially prepared soil is necessary. They may be cultivated through successive generations, and in different media, but they will retain their characteristics in every case." ‡

* Power, "Bacteriology in Relation to Surgery," Bradshaw Lecture, *British Medical Journal*, December 1886.

† *Ibid.*

‡ Coats' "Manual of Pathology."

The results obtained, in meat infusions and numerous other ways, are so constant and unvarying, that their application in regard to the all-important question of wound treatment ought at once to meet with universal recognition.

No sooner had bacteriology brought to light these facts, apparently so important in the practice of surgery, than means were taken to give them an entirely different complexion, and an endeavour made to nullify their practical application. In this attempt, the chemico-biological process of the putrefaction of meat infusions is not questioned, but its relationship to wound treatment is altogether denied, as will be seen from the following statement of the case by a high authority :—"Animal fluids exposed in open vessels to the air after some time become putrid, the length of time varying with the state of the air ; and so it is forthwith concluded, and argued by many, that if fluid upon the surface of a wound be exposed to the air, it must, while there, become putrid also. But the fact is, any one who cares to witness it may see fluid at any time on the surface of exposed wounds, which is not putrid. And the explanation of this most familiar fact is simple enough, that the fluid in the vessel has been kept until it has become foul, while the fluid on the surface of a wound in process of repair, which is daily watched, and properly managed, is ever being renewed. The same fluid ought not to be allowed to remain long enough to undergo a mischievous change."—Savory.

The feebleness of this reasoning, although it emanates from a high authority, opposed to Listerism, will be apparent at a glance. The whole argument turns on this—We are not to allow fluid to remain long enough on a wound to undergo putrefactive changes. We see fluid on the surface of wounds that is not putrid. Granted; but in how many wounds deliberately made are we able to watch the surface and remove the constantly renewed fluid? Practically none. Take an amputation wound for instance. Is not the whole wound surface shut out from our view the moment the last stitch is inserted? and is not the decomposition or putrefaction of blood and serous fluid, which may afterwards follow, merely a question of whether the wound is aseptic or not? There is no reaching it to remove so-called constantly renewed fluid. If we did, the proceeding would only be meddlesome and bad surgery. Even in many surface wounds of large extent, and where there has been much laceration, it may be, and generally is, impossible to keep them sweet without antiseptics.

The great conservatism of operative surgery, aided by antiseptic means, is well illustrated when applied to the fingers. A finger, say, is crushed to the extreme limit that surgery will allow without resort to amputation. What efforts will we make to save it! Although apparently a simple matter, it is in reality a crucial test between two methods. If rendered aseptic, and "kept in pickle"* by constant mercurial dressings, success will almost be assured in every instance. If treated wholly without antiseptics, the results will be disastrous in at least two-thirds of the cases treated. And why? In one method we keep the damaged tissues free from micro-organisms, and consequently from decomposition, and allow them to regain their impaired vitality ; in the other, we do exactly the opposite.

* Cameron, *Glasgow Medical Journal.*

In the minor surgery of country practice, I have had frequent opportunities of verifying this, especially in very hot weather, when the difference is very conspicuous. By keeping the parts in continuous contact with sublimate solution, every vestige of tissue will be saved that it is possible to save. Adopt any other plan, even with the aid of antiseptics, other than this particular one, and the result will be extremely problematical. It is believed that irrigation of a wound after an operation with antiseptic solutions is sufficient to destroy any germs that may have lodged in it. But does it do so? If any doubt remains, why not prevent them in the first instance, as the spray is capable of doing? Is there any other parallel in our surgical procedures where we allow an admittedly dangerous condition to be established, with the dubious belief that we may or may not be able to neutralise it? Wound infection, by micro-organisms from the air, is undoubted, and why not take means to prevent it. "The myriads of particles of filth or dust filling the air in all inhabited localities, contain, according to indubitable evidence, a very large proportion of spores or seeds, that on falling on the wound promptly develop, and set up fermentative processes known as decomposition." *

Take again the case of a fracture where the injuries are entirely subcutaneous, while the splintering of bone and laceration of the soft parts may be great and widespread. What is the consequence? Perfect recovery in practically every case. Allow germ-laden air to gain admittance—which it does when the fracture is compound—and what is the difference? On the one hand perfect recovery, as already stated; and on the other, in numerous cases (I am afraid to say how many), some of the following evils, most of them of grave import, and some of them absolutely fatal:—"Traumatic fever, inflammation, suppuration, waxy degeneration, hectic fever, formation of abscesses, sloughing, acute necrosis, gangrene, erysipelas, septic intoxication, septicæmia, and pyæmia."† And is not the whole fabric of subcutaneous surgery based on these considerations—air, or no air? The only effectual remedy against air contamination, at least in purely aseptic surgery, is the spray, or failing that, the thorough use of an irrigator. Unfortunately, the spray has been almost abandoned; and this is perhaps the most important modification that antiseptic surgery has undergone in recent times. Whether it is a wise one or not, remains to be seen. On what grounds this has been done, I have never been able clearly to comprehend. I am open to recognise the reason of its absence in abdominal surgery. But in operations in hospital practice, where it can be efficiently carried out, it is a positive gain.

I have on many occasions in cases of amputation (and excision of the breast especially), never touched the dressings from the moment they were first put on till the wound was perfectly healed. The successes attained by this method, and the dressing of which it forms an essential part, have been simply marvellous, and have been equalled by no other plan. I would make an exception to this in the proper use of the irrigator, to which I have just alluded.

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* Gerster, "Aseptic and Antiseptic Surgery."

† Cheyne, "Antiseptic Treatment of Wounds."

While in Edinburgh a little over two years since, I had the privilege of witnessing the practice of that eminent surgeon, Mr. Joseph Bell, whose name is inseparably connected with Edinburgh surgery. Mr. Bell used an irrigator, but so thoroughly and effectively, and apparently with so little trouble, that I am forced to admit that the spray would have been clumsy in comparison. When an irrigator is used as I saw it used there, it is a matter of indifference what becomes of the spray, the former answering the same purpose.

Dr. A. C. Patterson, at a meeting of the Medical Society of Glasgow, when various antiseptic appliances were under discussion—notably, sublimate gauze, just then coming into notice—stated, "that he was still old-fashioned enough to use the spray. His results for the last six months had been 137 operations and one death." In a private communication lately received from him, he informs me that, by the same means, he has completed 100 consecutive cases of excision of the breast without a single failure. This result requires no comment. On whatever grounds, then, the spray has been discarded by some, it is still doing useful work.

In whatever way an operation may be conducted, I wish to emphasise the fact, that no surgical cleanliness can be attained without the use of antiseptics. The more modern term "surgical cleanliness" is synonymous with Listerism, because the latter, properly carried out, means the former in its highest sense. It is no unusual thing to find surgical contributions terminate with something like the following:—"Although no antiseptics were used, every care was taken to obtain the greatest degree of cleanliness." When pure water does not exist (not available, at any rate, for surgical purposes), it is difficult to see how cleanliness of any description can be attained without antiseptics. They are absolutely indispensable. I do not mean to assert that they are the only important matters connected with wound treatment, but they occupy the first place.

The antiseptic surgery practised by myself, and which I will submit for your consideration, is somewhat modified by circumstances. Living as I do in the country, I cannot always command the use of the spray, and since the introduction of sublimate gauze dressing, I use chiefly the irrigator. It is of this method that I will now speak. I am careful, in wound treatment, to have a definite object in view. Stated briefly, that object is the thorough protection of the wound from all sources of infection, whether arising from the air or from solids or fluids. This, carried out in its integrity, would ensure its speedy and successful healing, without any local septic disturbance or constitutional risk to the patient. It would necessitate a perfectly aseptic wound, antiseptic surroundings, and efficient drainage. The latter, to my mind, is, next to the introduction of antiseptics, the greatest boon yet conferred on operative surgery. The method I adopt has not the charm of novelty. It is similar to that pursued by the generality of surgeons who practise some form of Listerism on a definite system. Nor is it characterised by extreme simplicity. I mention this, because it is often amusing to hear the complaints against aseptic surgery generally, that it is wanting in this feature. It is either continually forgotten, or altogether ignored, that the labour spent in a well-planned aseptic operation, however great, is in the end an enormous gain. This is a matter of daily experience, and need not be dwelt upon.

Selecting an excision of the breast to illustrate what I have to say regarding wound treatment, because it is one often performed in country practice, I would first say a word concerning the preliminary preparations, to which I attach supreme importance.*

The part to be operated upon is thoroughly washed with soap and water, and with ether afterwards, if thought desirable. This is followed by washing with carbolic acid solution. Lint, dipped in some of the same, is laid upon the part for a few hours previous to the operation.

I cannot too strongly insist, that a vigorous use of the nail brush should precede every operative measure, followed by a washing of the hands in carbolic solution. The same remark applies to everyone who may assist. In regard to the immersion of the instruments, carbolic acid solution is the only suitable fluid. Corrosive sublimate, although the antiseptic, is unsuitable from the chemical action it exercises on instruments not nickel-plated. This chemical reaction is also said to alter the quality of the fluid. It makes however, an excellent medicum for the sponges. The strength I use for this and subsequent purposes, is 1–2000. There is one matter apparently not of much moment, but in reality, of very great importance. Nothing is more common at an operation than to see instruments and sponges, when leaving the hands of the operator, put in every conceivable place on the table—on the patient even, instead of being returned to the solution by the hands of an assistant.† Especially is this likely to take place during a protracted and anxious operation. To obviate this, it is well to cover the patient with some impermeable material, previously antisepticised. If this is carefully adjusted, leaving the part to be operated on only visible, it will serve the purpose in view admirably ; but it is scarcely necessary to remark, that no precautions for such a purpose ought to be necessary.

The removal having been accomplished, how is the wound to be treated ? First, in regard to the hæmorrhage. Will we torsion the vessels, or ligature them with catgut ? I confess that I have never twisted a vessel of respectable size without considerable misgiving for the result, although those continuously doing it speak of it as the more effectual method of the two. In the hands of the distinguished President of this Congress, torsion has, I believe, attained a perfection rarely equalled. Whatever plan is adopted, the importance of stopping every bleeding point cannot be over-estimated. The disadvantages of oozing after an operation, and the collection of blood in the wound, are obvious. It may give rise to tension, requiring the dressing to be interfered with, and if not perfectly aseptic, will certainly decompose. Otherwise, its absorption along with other products will prove harmless, only giving rise to what is known as Volkmann's "aseptic fever." In an operation of this magnitude, thorough and complete drainage is indispensable. Draining, while imperatively necessary, has unfortunately serious drawbacks. We have to introduce a foreign body into the wound, which is a highly undesirable proceeding. Many attempts have been made to perfect our drainage material, but with only partial

* The preliminaries of wound treatment will be found at some length in Cheyne's little work.

† Gerster, *op. cit*

success. Ordinary tubing, especially the red variety, holds the first place. Decalcified bone has not realised the anticipations regarding it, and drainage by horse-hair and catgut have never come into much prominence. Of all kinds of draining material however, I prefer the latter, because it is fairly effective and perfectly harmless. Unfortunately, it will not drain pus, but blood or serum perfectly. But as the presence of pus in aseptic wounds is rare, it might have a trial in the first instance. Perfection in drainage will not be attained till we find some substance capable of doing so, giving rise to no irritation, and disappearing when its functions are fulfilled. In all wounds of the size we are now dealing with, stitches of relaxation should form a feature, be not too numerous, and firmly tied ; and in all aseptic wounds, the sutures for accurately bringing the edges together should be numerous. For both purposes I use chromicised catgut. Suppose the deep and superficial sutures inserted, the hæmorrhage stopped, and the drainage material in position, the wound is then thoroughly irrigated with corrosive sublimate solution ; it is then closed, and the sutures cut short. Finely powdered iodoform, or a mixture of iodoform and bismuth is dusted over it, when it is ready for the sublimate gauze dressings. A few layers varied according to circumstances are applied, and overlap the wound for several inches. These, being fixed in position by bandages of the same material, constitute the deep dressing. Over this is placed further layers of gauze, extending widely in all directions, and over all, equable elastic pressure. This may be graduated with such nicety as to give not only the most efficient support to the dressings, but positive comfort to the patient. Pressure applied by means of some elastic substance, has much to do with the success of wound treatment, not only for the reasons just stated, but for the perfect rest and immobility which it ensures, and which ordinary bandaging is incapable of accomplishing.

In a wound treated in the manner indicated, what is there to interfere with its future progress? It is presumed to be thoroughly aseptic so far, and protected from all sources of infection. The chief danger undoubtedly lies in the first dressing, and this, other conditions being favourable, should be delayed as long as possible. Possibly, one dressing only will be needed, and that at a time so advanced that no contamination need be feared.

Macewen, when discussing the value of antiseptics at a meeting of the Glasgow Medical Society, said, "that in his last forty consecutive cases of primary amputations, excluding some who died within forty-eight hours after admission, healing took place after one dressing—that put on at the time of operation. In excision of the knee, he had now no occasion to use paraffine or plaster, as the wounds generally healed under a single dressing."

I am not aware of any rule as to when the second dressing of an aseptic wound should take place. I would not touch it without some very decided indication. The thermometer might be thought to give some sign, and although a sharp rise is often present, it generally depends on the absorption of wound products, which are harmless, because pure. This "aseptic fever" then, as it has been termed, is a matter of no moment. With the exception of pain or tension in the wound itself, or the appearance of discharge external to the dressings, I know of no condition that would justify us in interfering at all.

Nothing can be more conducive to invite disaster under such circumstances, than frequent and consequently meddlesome treatment. An early dressing would require the same scrupulous care as the first. An irrigator must be kept continually playing over the wound, from the time the dressings are removed till their re-application. Should local inflammatory conditions supervene, and where the strict adherence to this routine has to be abandoned, much may still be done to carry out asepticism. This is particularly to be desired, as the disturbance generally depends upon excessive tension, from fluid as yet perfectly free from a trace of decomposition. If the application of heat is called for, which it generally is, in addition perhaps to the removal of some stitches, and attention to drainage, I am decidedly against the employment of poultices, as generally understood, of which linseed meal may be taken as the type. They are dirty, inelegant, and above all, fruitful sources of contagion. A suitable number of folds of boracic, carbolised, or sublimated lint applied frequently as a fomentation, and covered by any material that will retain the moisture, fulfil every indication. Not only so, but their application is based on principles, while the former is only the result of a past and present empiricism.

From this imperfect sketch, it will be seen that an effort is made to give practical effect to the great principles of Listerism, viz., the exclusion of active ferments from a wound, or surgical cleanliness, if you will. The difference exists in name only. Anything less would not be much in advance of the surgical practice of fifty years ago; while in the direction of more completeness, it is capable of much improvement.

The choice of antiseptics is a varied one, but may for all purposes be reduced to four—carbolic acid, corrosive sublimate, iodoform, and borosalicylic solution, the latter being a most admirable agent where a large extent of surface has to be dealt with. I would employ carbolic acid almost exclusively for cleansing the hands, the parts to be operated on, and the immersion of instruments. In this respect it has always stood, and stands now, without a rival. The choice is limited in number, for a very simple reason. They are the best that experimental and clinical evidence has yet furnished us. In limiting the number, we become thoroughly acquainted with their individuality, if I may use the term, and attain a correct knowledge of what each is capable of accomplishing.* In this connexion, a curious and to me inexplicable anomaly is far from infrequent. Nothing can be more certain than that two of the substances at least possess absolute and definite powers in relation to micro-organic life; and how constantly do we hear this called in question or denied, because at times they fail? Is it so in medical therapeutics? Do we question the specific action of colchicum in gout? mercury in syphilis? salicylate of soda in acute rheumatism? or digitalis in certain cardiac conditions, because in some cases we find them useless and inert? Is it always the fault of the drug, and not of the administrator? No condemnation can alter the fact, that corrosive sublimate and carbolic acid have specific actions in wound treatment. The truth of this, any one can verify for himself. Comparisons of a like nature might be made in answer to the charge, that they have been productive of fatal results. Unquestionably, they have. So has chloroform inhalation; so has the

* Gerster, *op. cit.*

insignificant operation of vaccination, but neither will be abandoned on that account.

The introduction of corrosive sublimate marks a distinct era in our progress. "Its discovery as an antiseptic, or the very high order of its powers, are not due to Koch, as many suppose. Eighty years ago, Waterton, the celebrated naturalist, during his wanderings in South America, used it for preserving the skins of animals. A little later, Kyan used it for preserving wood for building war ships, from dry rot. In 1865, its antiseptic powers were first compared with other bodies. In that year, Dr. Angus Smith found that when it was mixed with blood, the amount of putrefying gases evolved were too minute to admit of determining their quantities; while, with many other antiseptics, including carbolic, tested under identical conditions, these gases were produced in large quantities."—(McDougall, *Glasgow Medical Journal*). To Koch in Germany, and Lister in England, undoubtedly belongs the credit of being the means of practically making it available for our surgical wants. At the present moment, it is pre-eminently the antiseptic in wound treatment, and in fact every condition where sepsis has to be guarded against. A single instance of its power will be sufficient. In fluid suitable for the growth of micro-organisms, but treated with sublimate solution, no organisms had appeared after it had been kept 182 days.

Iodoform is most valuable, either pure, or mixed with bismuth. In the minor surgery of country practice, its use fulfils an acknowledged want. In operations about the anus or genito-urinary organs, it has really no substitute. In cases of supra-pubic lithotomy and extensive perineal section lately, I used this substance entirely. In the former, there was considerable necrosis of tissue, fiom the action of the urine. Though both advanced in years, free livers, and with a suspicion of kidney disorder, their recovery was perfect. The sublimate is quite inadmissible, where there is any indication of kidney disease.

Boro-salicylic preparations may be used on all occasions, and in any quantity. Although their antiseptic powers are not great, they are often valuable and handy for very large surfaces, where the use of those already mentioned might be attended with risk.

Such are some of the means we take to prevent blood-poisoning, a condition absolutely depending on the presence of bacteria in a wound. Whether we regard the poison as due to the result of their chemical action, and the production of ptomaines, or the entrance of putrid matter, of which they form a part, into the blood, matters little. They originate in our operation wounds, and it is our duty to prevent them, which is the cardinal principle of Listerism. Its chief value lies in its precision, and the unanswerable reasons which can be given for every stage of its process. It seeks to bring surgical treatment into something like harmony and definiteness of purpose—a thing of which we must all feel it stands much in need. Surgery is beginning to feel the influence of a power that has raised it, and will continue to raise it, to a higher level. Pre-antiseptic surgery was almost empirical—a groping in the dark. As a consequence of this, its professors, even of the most brilliant talents, were quite unable to look ahead, for the simple reason, it was quite impossible to predict how an operation, in the majority of instances at least, would end. The act once committed, was beyond the reach of any

controlling power. At the present time, we cannot speak of the results of operations with absolute certainty, it is true ; but we have come very near it. So far as blood-poisoning is concerned (and that is the only condition engaging our attention), with a patient in good health, and surrounded by all the hygienic conditions that modern surgery justly demands, we can now in many cases promise results. And why? Because of the power we possess over septic processes.

The limits of this short paper will not allow me to allude to the results which aseptic surgery has accomplished. This is scarcely to be regretted, as they are now matters of history. A study of surgical statistics generally, and those of aseptic surgery in particular, will show the conspicuous superiority of the latter. In a series of 295 operations by myself, the death-rate was only a fraction over 3 per cent. One case alone died from blood-poisoning.

Even in spite of Listerism, with all its safeguards, minuteness of detail, and the sustained attention it demands, we have still to face a certain mortality from blood-poisoning. The age of "perfect surgical cleanliness," has not yet arrived, nor will it, as long as this scourge of surgery follows in our track. That Listerism has stayed its ravages in a remarkable manner, has robbed it of half its terrors, and even shown a way by which it may be eradicated, are facts which do not require to be insisted on, and which few will deny.

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